HAWAII MEDICAL JOURNAL

JANUARY, 1942

$2.00 per yr.
35c per copy

Volume 1
Number 3

(Cost of single copies of this issue, because of its unusual nature and size, will be 50 cents per copy.)

Published Bi-monthly by

THE HAWAII TERRITORIAL MEDICAL ASSOCIATION

(Incorporated in 1856 under the Monarchy)

Mabel L. Smyth Memorial Building

510 S. Beretania St.

Honolulu, Hawaii, U.S.A.

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1941-1942

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War Came to Hawaii

And how did it find us?

Providence could not have been kinder to the boys who had their baptism of fire on that morning of surprise, than by having in Honolulu Dr. John J. Moorhead, veteran of the last world war, and authority on traumatic surgery.

Only three days prior to the 7th, Dr. Moorhead arrived to give to the doctors of the islands an intensive postgraduate course in the handling of war injuries. And on the fateful Sunday morning a crowded hall of doctors awaited his lecture on burns. For three sessions he had drummed into a record audience of 300 civilian, army and navy doctors the several cardinal points of procedure in the handling of wounds. And they certainly were applied that day, Sunday the 7th, not alone by the Army and Navy surgeons but by the 20-odd civilian surgeons and physicians who all that day and night assisted their military colleagues in caring for the many casualties brought to the military hospital. No need for the surgeons to hesitate in the face of the ugly, extensive wounds that came into their hands. Dr. Moorhead had told them what to do, simply and with the authority of a man of experience. And he went as eagerly as did the civilian doctors when the call that interrupted and temporarily terminated the lectures, came from headquarters.

And more important, Dr. Moorhead and his pupils had the keen satisfaction of seeing the results of their work. Only 11 cases of gas gangrene (all of which recovered) and "not a teaspoonful of pus—not a serious infection" was what he reported weeks later, just before his departure. What greater reward could any physician ask!

Said Dr. Moorhead in his farewell to the physicians on December 30th:

"Honolulu has been the proving ground for the technique of handling war wounds. I shall recommend that this technique be adopted universally throughout the country."

And what he said further is also recorded, not with the idea of glorying in self-praise, but that it becomes a matter of record:

"The United States of America owes you, the civilian doctors of Honolulu, a debt of gratitude for the work you did on December 7th, and I shall make it known in high places what you did here."

> "I WAS GREATLY PLEASED TO SEE WHAT A FINE JOB THE MEDICAL PROFESSION OF HONOLULU DID IN THE RECENT EMERGENCY. THE AID WHICH IT GAVE TO THE MILITARY FORCES OF THE ISLAND WILL ALWAYS BE A BRILLIANT CHAPTER IN THE HISTORY OF MEDICINE IN OUR COUNTRY. DR. ARNOLD AND DR. PINKERTON DESERVE THE HIGHEST PRAISE, SO TOO DO THE MANY CIVILIAN SURGEONS WHO SO SPLENDIDLY GAVE OF THEIR EFFORTS. THE VERY LOW MORTALITY WAS IN PART DUE TO THEIR COOPERATION. NO ONE WILL EVER DOUBT THE VALUE OF THE SULFONAMIDES AND OF PLASMA IN THE TREATMENT OF WAR CASUALTIES. THE EXPERIENCE HAS BEEN OF ENORMOUS HELP IN PLANNING FOR THE FUTURE. GREETING TO MY FRIENDS."
>
> Dr. I. S. Ravdin
> Philadelphia

In inviting Dr. Moorhead to come to Hawaii, our Post-Graduate Committee by design had in mind to prepare the civilian doctors particularly against just such an indent as occurred, but it had no idea that the knowledge and guidance it sought would be so quickly applied. Every physician, Army, Navy and civilian, can be thankful to that committee for its forethought and its choice of the man.

This story would not be complete, if attention were not directed to the swift and competent mobilization of the ambulance service and first aid units under the direction of Dr. H. L. Arnold Sr. and Dr. Robert B. Faus, acting for the Honolulu County Medical Society's Preparedness Committee, and the work of the blood bank under the direction of Dr. F. J. Pinkerton and Dr. John Devereux. Within an hour 18 first aid units went into action, and the Preparedness Committee had 100 trucks rolling within an hour, some immediately, to the scene of combat at Hickam Field and Pearl Harbor for the transportation of casualties to the Army Hospital. Many comments were heard about their capable performance and

days later there was still great speculation as to who had dispatched them. Only 4 of the 18 first aid stations took care of casualties, but all of them were manned and ready for action. One—at Lunalilo School — was actually bombed, but promptly rallied and reestablished itself nearby.

The meagre supply of 200 flasks of plasma in readiness was immediately dispatched to Army, Navy and civilian hospitals and a feverish activity was begun to augment that supply.

Forever be it said for the civilian population of Honolulu, that it responded as one man to the needs of the day. It took some time for the transition to take place in the minds of all of us that this was not a maneuver, that the Japanese had actually arrived—an utterly inconceivable reality. It took some time to convince most of us that the smoke arising from Pearl Harbor and Hickam Field was not a burning cane field or a burning oil tank, or a bit of chemical realism added to routine maneuvers; and many of us watched and commented on the maneuvers and the puffs of smoke in the sky. Not one credited the first reports that it was an attack, but when the truth was brought home there was no hesitancy or panic. Radio orders and instructions were carefully followed out and orderliness reigned throughout.

That word *orderliness* cannot in honesty be applied to the weeks that followed in an attempt to get things organized. However, organizations have been shaken down finally and there is evidence of planning coming to the top.

—E. D. B.

Dr. Moorhead (seated, left center), Mrs. Moorhead (standing, center), and members of the Honolulu County Medical Society, following presentation of a commemorative plaque by Dr. James R. Judd.

Principles of Traumatic Surgery

Notes on post graduate lecture series given by John J. Moorhead, M.D., Professor of Clinical Surgery, N.Y. Post Graduate Medical School, Columbia University (Ret.).

TRAUMATIC SURGERY

Dec. 4, 1941

Traumatic surgery is part, and a very large part, of general surgery. It has no selective action and may involve several parts at the same time. I shall speak of certain outstanding symptoms and methods of treatment in common injuries.

A very good starting point is that very difficult and important hand infection group. Next to the eye, the hand is of greatest importance. It is my belief that infection of the hand is treated more poorly than any other type of traumatic surgery.

Any break in the skin should never be disregarded. There is no such thing as a clean accidental wound. Every wound that is not made with surgical intent is already infected and should be so regarded. Our problem then is the treatment of infected wounds.

Golden Period

What are the essential things in regard to repair and recovery? What are the determining elements? Is it the source—a razor, a piece of glass, a nail? All these play a part, but the time element intervening between receipt of the injury and the time of institution of adequate treatment is probably the most important thing. There is in traumatic surgery what I call the "Golden Period" —the first six hours elapsing between the injury and the institution of care. I was a general surgeon before I became a bone setter and I know what happened after going more than six hours with a ruptured appendix or duodenal ulcer. If I got in before then most of them got well; after that most of them died. Before six hours I was treating the rupture; after six hours I was treating the peritonitis.

Suppose before you get the case, somebody has done something else for it. That brings up the first aid situation. I wish they did not do anything. They think that if they put in something very nicely colored, that is enough. Those antiseptics are very colorful, but to use them is not good *traumatic* surgery—it is *chromatic* surgery.

Cleansing

There are only two ways of treating a wound; only two ways to clean a wound—mechanical sterilization and chemical sterilization. Mechanical is by debridement and chemical is by drugs. If a patient is seen by us within the first six hours, we give one type of treatment; if after six hours, another type of treatment. We are not going to do anything to an already infected wound that we do to a non-infected wound. If we go into infected territory and do what we would like to do to a non-infected wound, we will spread the infection.

First of all, within the first six hours, we cleanse. With what? Soap and water. What next? More soap and water. What next? More soap and water. Rub it gently, but don't scrub. If it is a ragged wound and the edges are brown we debride them. What does debridement mean? To remove the debris? No. It is a French word and it means unbridling. It means to sparingly excise all the damaged tissue. Organisms cannot live on anything healthy, they die. We excise until three criteria are attained: (a) it bleeds; (b) it looks healthy; (c) if it is muscle, it contracts. In some cases it may mean 1/32 of an inch, it may be half an inch, but we do it until those three criteria are fulfilled. Then we stop the hemorrhage.

Sutures

Shall we do primary suture? I am going to be very radical and say don't sew anything that requires debridement. Put in your sutures of some non-absorbable material, place a dressing over it, and don't tie those sutures until the end of the third day. That is a primo-secondary suture. At the end of the third day, take the dressing off, bring the sutures together and you will be surprised to find how nearly you have attained perfect coaptation.

I think an excellent dressing is sulfanilamide, 15 grains to the ounce, in mineral oil or sterile

Delivered before the Honolulu County Medical Society in the Mabel L. Smyth Memorial Building, Honolulu. December 4, 5, 7, 22-30 1941.

Editor's Note: These notes are a summary from stenographic transcript. Circumstances prevented their being edited by Dr. Moorhead before publication.

vaseline as a wet dressing. Use a large dressing to immobilize the injury and keep it quiet. Hand cases should be well splinted because motion has a capacity to cause infection to spread. The kind of splint does not matter.

INFECTED WOUNDS

I am a great believer in hot wet dressings in an infected wound. I like a saturated solution of mag. sulph., several layers of gauze, with the solution dripping through. Use an electric light to keep it hot. I use it until I get indications for incision and drainage. Don't cut except for one of these three if you would not metastasize your infection: (a) localized fluctuation; (b) localized tenderness; (c) localized induration. When you cut, cut until the wound is gaping; ordinarily that means going through the fascia. For drainage use the end of a rubber glove, or an ordinary pipe cleaner. Use gauze only in two places (a) to stop hemorrhage and (b) to keep wound edges apart. And if you have to use gauze, oil it with vaseline or mineral oil.

FOLLOW THROUGH

The follow through is more important often than anything except the initial treatment. Function is the end in view. Let us start reasonable motion early. Don't put the hand into a hyperextended, hyperflexed position. Put it in a position of ease, ordinarily that is in a partially flexed position in any and every joint. To promote function have the individual try to make motions almost from the beginning. Get the bad side to imitate the good side. Physiotherapy is regarded as a sovereign method in helping to restore function. I am a great believer in physiotherapy if the person who is directing the treatment does the physiotherapy. Long wave, short wave, diathermy, all have their place, but my reliance mainly is on what I can get the patient himself to do.

SUMMARY

Traumatic surgery is emergency surgery and the fundamental thing is "to do it now." The six hour period is the Golden Period. If we can take care of our wounds during that time we are very much less likely to get infections. After the six-hour period there is a different type of treatment because the situation is different. Let us debride our wounds; let us use the sulfa drug on the outside as well as internally; but do not regard them as substitutes for the ordinary surgical asepsis of years back. In the infected cases the sulfa drugs are invaluable, but don't rely on the sulfa drugs to carry you through; the sulfa drugs won't do it without giving the wound ordinary cleansing; and don't forget that the sulfa drugs are specific for infections of the erysipelas type and other cellulitis. Do not sew up a debrided case, and above all do not sew it up in a compound fracture. In infections there are three indications for incision: local fluctuation, local tenderness and local induration. Never for brawny induration; never for adenitis.

THE TEN COMMANDMENTS OF TRAUMATIC SURGERY

I. Thou shalt have no god of trauma other than the welfare of thy patient.

II. Thou shalt not bow down to any graven image except Knowledge and Experience.

III. Thou shalt not take in vain the name of those who diligently seek the welfare of thy patient.

IV. Remember to give thy patient rest on the days following injury.

V. Honour the parents of traumatic surgery who gave birth to and practiced this branch of general surgery.

VI. Thou shalt not kill thy patient by neglect nor by the practice of alien doctrines.

VII. Thou shalt not commit adultery by conniving clinic crimes designed to conceive such offspring as infection, deformity and disability.

VIII. Thou shalt not steal the ideas of thy brother practitioners without due recognition.

IX. Thou shalt not bear false witness against thy brother practitioners who probably did as you would have done.

X. Thou shalt not covet thy fellow practitioner's skill, his equipment, his hospital nor anything else that is his, except his reputation, his knowledge and his experience.

JOINT INJURIES

December 5, 1941

In the consideration of joint injuries the lesions are: contusion, sprain, synovitis, bursitis, wounds, foreign bodies, joint calculi, dislocations, fractures.

There is in any joint injury a certain routine incidence. I think it runs about like this—a sprain, a synovitis, a calcified bursa. In the majority of cases indirect rather than direct violence causes the joint difficulties. We often have difficulty in differentiating dislocations from fractures. Let me call your attention to a clinical rule which is an excellent one. In any recent joint injury associated with deformity and disability, suspect a fracture first and not a dislocation—with one exception—in the shoulder joint. In it we have over 50% of all the dislocations which occur in the body and here direct violence is the most common causative factor.

A *contusion-sprain* is the most common injury, with the wrist and ankle most often affected. Here the differential diagnosis between sprain, dislocation and fracture is sometimes very difficult. If it happened by indirect violence, watch your step. Let me give you another clinical rule—localized tenderness is just as important a symptom in traumatic surgery as it is in abdominal surgery. Localized tenderness around a joint ordinarily means fracture. In a joint fracture tenderness is local and focal; in a contusion-sprain, it is general and vocal.

In an *acute sprain,* if we can get the case in the first hour before swelling has occured, try to get the joint into very hot water, preferably running water, massage it for a few minutes, then strap it, and strap it hard. Use elastoplast: it is ideal for joints. If it is an ankle, strap it up and make the ankle point toward the place where the pain is. You will find straps 2½ or 3 inches wide excellent. At the upper end, split them; first for a broader base, and second for better circulation. Exaggerate your position so that the foot turns toward the place of pain. Let your patient walk. Teach him to walk with the aid of a chair, with feet flat on the ground, taking small steps. He will gain confidence by having something to hang onto and you have gotten him away from the crutch habit, as well as having restored circulation. You leave on the straps four or five days, sometimes ten days. If you like, they can have physiotherapy. I have something I call the SOL treatment. S - soap, O - oil, and L - light. I tell the patient to make up a solution of hot soap suds, take two wash cloths, and apply for ten minutes as hot as possible, then apply warm camphorated oil for ten minutes. This treatment is repeated twice daily.

What about plaster of paris in sprains? I say "No." My belief is that joint cases should be treated by mobilizing rather than by immobilizing. Do not make it necessary for the patient to get over the treatment as well as the injury.

The treatment of a wrist sprain is the same. Do not stop at the wrist joint, bring it up.

Foreign bodies in the knee joint are a tremendous problem. They should be located before any attempt is made to remove them. Remember that the vulnerability of any joint to infection is great.

Bursitis occurs primarily in the shoulder and at the knee joint. Let us consider a subdeltoid bursitis of the traumatic type, not the systemic type, although in my opinion the two are closely related.

In the *acute shoulder case* I use elastoplast strapping. Four straps. Again I split the ends. Start up high with one strap and go down to above the elbow. With the second, start at the scapula, bring it over onto the chest wall, and so on, so that there is an elastoplast shoulder case. In addition give injections of sodium cacodylate. Why this helps I do not know. Give enough sedatives to help the pain.

In *subacute shoulder cases,* physiotherapy sometimes is good—diathermy, short wave or long wave.

X-ray your cases. Not just the ordinary AP and lateral, but x-ray around the clock, otherwise you will miss some of the calcium deposits. If the strapping does not help, find the spot of localized tenderness. Keep the arm at the side and novocaine that area with one or two percent. Then with your needle try to find the calcium deposits. Put the novocaine in several places with the idea of trying to hit it.

The next thing is to wash it out. The two-way washout helps where the calcium deposit is fairly liquid.

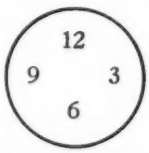
Operate when the pain becomes unbearable. Operation is incision and drainage, and it is successful. Sometimes it is bilateral and the patient can have these without any manifestations. They

are sometimes induced by trauma and sometimes by a certain type of injury.

With subdeltoid bursitis one cannot lift a telephone or a book, or put on a coat.

Now the *knee*. A direct blow is ordinarily the cause. There are three lines of treatment. During the acute stage: rest, cold wet dressing; after 48 or 72 hours: aspiration with or without injection of some irritating medium like sodium morrhuate; and finally, if they fail to respond to that fairly conservative treatment: excision. When you excise do not get too close to the knee joint, because it is most vulnerable to infection.

Synovitis of the knee is very rarely due to a direct blow, it is usually indirect trauma. The best treatment is early aspiration. Water on the knee is not water, it is not a sero synovitis, it is a hemorrhagic synovitis. In aspirating the knee, I like to visualize the knee as the face of a clock:



Flex the knee slightly, put the patella to the outer side, using the under surface of the patella as a guide. On the right knee, introduce the needle at 9 o'clock and push it to 12. On the left, introduce the needle at 3 o'clock and push it to 12. Use a fairly good sized needle. Have someone compress the knee so that all the material in the bursa comes to the surface. One case of mine had bloody fluid for nine weeks. I think aspirating the knee is perfectly safe and I advise you to do it. If you do not wish to aspirate, the next best thing is massage, by an expert masseur. Remember there is no muscle in the body that atrophies quicker than the quadriceps. Teach your patient to lift the leg off the bed, make him use effort to activate the quadriceps to prevent atrophy and lessen disability. And start it right away because at the end of 48 hours you will be amazed at the amount of shrinkage. Make your patient put the good leg over the bad one and try to lift it with the bad leg.

Now how about injury to the *cartilage* and the *subpatellar fat pad,* and *hypertrophic synovitis?* (I call them the adenoids of the knee joint). The internal semilunar is most often the offending cartilage. I have never seen a cartilage injury due to direct violence. It is usually due to eversion and rotation, as in a skiing injury. One best bet in making a diagnosis of cartilage injury is to inquire into how it happened.

Indirect violence, eversion or inversion of the leg may lead to one of three things: synovitis, or damage to the semilunar or the medial ligament. If you have a big swollen knee, is it synovitis alone, or is it this plus something else?

The vast majority of injuries involve the inner side of the knee, and if we compare ourselves to the four-footed animals we can see why —our upper extremities become our forelegs and the lower ones our hind legs.

In making a diagnosis look at both knees with the patient seated on the table, legs dangling over the edge. Look at the good knee first. Ar repitus? Don't forget the stethoscope in trying to pick up joint pathology. In the case of a cartilage it will be amazing what you can get through the stethoscope. Remember, locking is one of the rarest signs of a cartilage injury. If you find localized tenderness over the tip of the condyle, you have an injured ligament; if tenderness is brought out by eversion of the foot or by extension, you have a damaged semilunar. History of an eversion type of violence, pain, swelling, localized tenderness, are the three signs that will put it into the ligament or semilunar class. The rest are corroborative signs.

The treatment is the same as with synovitis. Aspirate or have it massaged and put in some form of splint. If it is locked, make your patient lie down flat on the table, swing his knee, many, many times. Put a thumb over the internal semilunar and tell him to kick out straight. Press your thumb after you have it relaxed. That sometimes does exceedingly well. The second method: again flex and again manipulate it many, many times; have an assistant hold the thigh; give it a quick pull down and then extend it. If that does not do it, put him face down on your table, hang the leg over the side of the table and tie a weight to it to give it traction. Sometimes it is necessary to give intravenous anesthetic and reduce. Then treat it as if it were not a locked case.

Suppose it recurs? Suppose the patient says he is all right going up stairs but has to hang on to a bannister going down. If he tells you that, it is in internal semilunar. I let them have one attack and operate. The results are good.

In acute cases, there are two types of operation. One is a large medial lateral incision, and the other is the small incision. In the case of acute

case we can make a reasonably small incision. If the case has gone on for a long time you plan your incision so that you can do an exploratory. I do them under spinal anesthesia. Don't put in a stitch. Heavy dressing is indicated. They are usually out of bed in five days and out of the house in ten days or two weeks.

WOUNDS

December 5, 1941

Every wound that is not made with surgical intent is already infected, hence our problem is essentially the treatment of infected wounds. The treatment not only depends on the type of wound the source of wound, and the type of individual affected, but it is predominantly tied up with the time element. We have here what I called the "golden period." The first six hours are the essential period. If we delay beyond the six hour period we have not only the wound on the surface of the body, not only the initial trauma but we have the additional thing of infection.

We have three great foes in all trauma—shock, hemorrhage and infection; and there are the Four Horsemen in trauma—death, disability, deformity and despair. If we would control that quartet we must do it in time.

For our purposes we have three types of wounds: incised, lacerated, crushing.

INCISED WOUNDS

The incised wound is just as great a source of infection as the lacerated wound. When they come to you they have most likely had first aid treatment. I don't care what they do so long as the tissue has not been damaged. If I had my way *I would have that wound covered with a sterile dressing and nothing else.* If the case comes to you in the first six hours the first thing to do is cleanse it with soap and water, plentifully, until the wound is as surgically clean as your hands would be for an operation. Then dry it. Stop the bleeding. If you wish, paint the edges with any antiseptic. I don't like to put antiseptic into a raw wound. Then drain. A rubber band makes an excellent drain in some cases; an ordinary pipe cleaner in others, particularly in wounds of the tortuous type. If you are sure of the source of the wound and sure that it has been adequately cleansed, I think it is safe to suture, but let us really play safe and not suture any accidental wound. Put the sutures in and don't tie them until three days have elapsed.

Any kind of sterile dressing may be used for your incised wound. If you wish, use the sulfa compounds. The essential thing is to fix it so that the wound will be absolutely immobile, therefore, I say use a heavy dressing, and if it is a moving part, put a splint on it, in a comfortable position.

LACERATED WOUNDS

Whether it is one wound or a series of wounds, within the six hour period, the same procedure—soap and water, dry, paint the edges, remove all frayed, devitalized damaged tissue by debridement with a knife or scissors. Skin, muscle, fascia are excised where devitalized. Debride until you have your three criteria: a) until it bleeds; b) until it has a normal color and looks clean; and c) if it is muscle, until it contracts. The next thing is hemostasis; then drying out the wound; then placing of sutures. Use non-absorbable suture, deeply, taking in all the tissues; do not tie until end of the third day. Use a heavy dressing and, if a mobile part, a splint.

CRUSHING WOUNDS

These are the cases with great macerations, in which surgical judgment is infinitely important. What are the indications for taking off a limb? The rule is—and it is an infallible rule—to amputate for the following:

(1) Extensive damage to the vascular supply
(2) Extensive damage to the soft parts, muscles and tendons
(3) Extensive damage to the bone
(4) Extensive damage to the neural supply.

Are there any exceptions? Yes, in a working man, it is very much better to take off a finger than to have him go on with an osteomyelitis. Don't let us forget the old surgical axiom "once an osteo always an osteo." A limb that is going to be a mess as far as function is concerned is also an exception.

In an emergency we do a chop amputation rather than a shaped amputation. In the lower extremity I like an amputation through the leg rather than through the ankle joint.

INFECTED WOUNDS

Let us call the period after six hours the infected state. Personally in these cases I prefer to do no surgery until there are certain definite indications. I try to focalize it by hot wet dress-

ings—I don't care what, just so they are wet and hot. I like several layers of gauze with a Dakin tube, a fenestrated tube, with the solution going through. After I have it focalized and have given sulfa drugs by mouth, I can do something if certain indications are present:

(1) Definite *localized* fluctuation
(2) *Localized* tenderness
(3) *Localized* induration.

Do *not* operate for lymphadenitis and lymphangitis.

And when I cut I try to keep within the area of infection and keep out of the clean part, otherwise there may be a blood stream infection.

When to give tetanus antitoxin and when to give gas gangrene antiserum? In soil-contaminated wounds, in firearm wounds and in crushing wounds. I think it important to test your patients for wheals. It is safer to give it than not to give it. Remember also that occasionally in burn cases we get a case of tetanus.

HEALING

Generally speaking, what wounds heal better? Those from the neck up—the face wound will heal well. On the scalp, if it is well shaved, it will ordinarily heal well. The reverse is the case with the shin and hands—they heal poorly. When the time comes for the wound to be given some aid in healing I like to give it exposure to sunlight or electric light. This gives me greater granulation surface. Ten minutes of light twice a day, gradually increasing to one-half hour twice daily using the sun or an unfrosted bulb twelve inches away. Of course, you don't need artificial sunlight in Hawaii.

For the wound that is foul smelling, sunlight is very good. My favorite dressing that is particularly valuable at night is equal parts of camphorated oil and mineral oil. For something more active try scarlet red, a dram to an ounce, either paste or liquid. Also to aid in granulation and reduce odor, if sunlight does not do it, solution of potassium permanganate 1:500 will.

For the patient who just is not doing well, who won't eat, won't sleep, whose temperature is up a little, whose blood count is not what it should be and whose wound is sluggish, try repeated small transfusions. That is the best prescription for systemic infections. There are two excellent clinical indices of progress—if the patient can sleep and if he can eat. And don't forget to look at his tongue, to find out if he is dehydrated. There is a lot of talk about sending things to the laboratory, but the tongue is an excellent indication.

SUMMARY

Wounds

Every wound not made with surgical intent is infected.

Golden Period for treatment—first 6 hours post-trauma.

	Cleanse	*Debride*	*Sulfa*	*Drain*	*Suture*	*Splint*
Incised (Soap & water)	–	–		– or +	+	–
Lacerated (Soap & water)	++	+	+		–	+
Crushing (Soap & water)	+++	++	++		–	++

Infected Wounds

Early treatment: hot wet dressings of mag. sulph., ac. bor., saline.

Late treatment: same, until localized, then incision, sulfonamide, drain, splint.

Do not incise for cellulitis, lymphangitis or lymphadenitis.

Give tetanus and gas gangrene anti-sera in { Soil contaminated / firearm in muscled area / crushing } wounds.

Best drains:

(1) Rubber band, glove-finger or tubing.
(2) Pipe cleaner.
(3) Gauze (oiled) only to stop bleeding, or to keep edges apart.

Remove early, 1-3 days.

Healing: Scalp and face heal kindly.
Hand and shin heal poorly.

Sutures: Use non-absorbable interrupted sutures of silk, silkworm. Primo-secondary, or delayed suturing is the method of choice in any wound with signs of contusion; hence safest in auto accidents.

Granulation: To aid granulation use sunlight or electric light, or oil. camph. 1 part and mineral oil 3 parts.

Odor: To reduce odor, use sunlight or elec. light, or potass. permang. 1:500.

Sulfa drugs: For potential or actual infection, use sulfonamides on the wound, 15 grains to oz. of min. oil or vaseline, and also internally.

Erysipelas: streptococcus cellulitis: Sulfonamides are specific.

Transfusions: repeated small transfusions are best treatment for systemic infection.

From author's forthcoming book: "Clinical Traumatic Surgery", W. B. Saunders, publishers.

BURNS

Sunday, December 7, 1941
9:00 a.m.

Dr. Moorhead had barely started to lecture on the subject of burns when the call came for surgeons to go immediately to Tripler Hospital. He joined the twenty or thirty civilian physicians who started out immediately.

RETROSPECT

December 11, 1941

Meeting of the Honolulu County Medical Society to review the experiences of the 7th and to present, with Dr. Moorhead as spokesman, uniform rules and regulations for the treatment of certain types of cases, adopted by the special committee.

A lot has happened since we met here last Sunday morning. How fortunate that the schedule of lectures had been re-arranged so that we had the lectures on the treatment of wounds before the 7th and were prepared when the necessity arose to put our knowledge into mass application.

Since then they have taken off my civilian clothes and put me in these. I am in the army now.

Never in all my experience—and I was 19 months abroad and was commanding officer at an evacuation hospital—not even in the Argonne, in the 8 months I served with the French, did I ever see so many seriously injured men admitted to a hospital in such a short period.

What happened at Tripler, with 400 major casualties coming in steadily from 7:50 AM to 1:50 PM, would have happened in any hospital; in the best hospitals of New York City or any other place, prepared or unprepared; there would be, inevitably, confusion. There was confusion. There was difficulty in getting supplies for a time. There was a shortage of supplies for a time. But let me say to you that I am proud of that outfit; I am proud to have been associated with it. When I say "that" outfit I mean the surgeons of your own group and the personnel connected with the hospital. I have had occasion to say in several places that to have been associated with you was one of the great privileges of my career.

CONFUSION

Now if we had it to face again tomorrow, there are certain questions we should be asking ourselves. How can we avoid the confusion? What were the things we should have done?

1. We should have patients better prepared before they come to the operating rooms, with fluids, plasma, or blood transfusions;

2. We should have teams of surgeons—one team for abdominal surgery, one for thoracic surgery, and so on;

3. We should have surgeons working with assistants who are used to working with them;

4. We should have a willingness, a mental elasticity, to change from civil surgery conditions of the leisurely type to the sudden emergency conditions of the military type.

WAR SURGERY

War surgery is not civil surgery. Let us understand that as an essential thing. You cannot do surgery under these circumstances in the same way as you would under civil conditions. Your object is *to save life* (1) by preventing hemorrhage, (2) by allaying shock, and (3) by every possible effort to prevent infection. Plastics—no. Elaborate operations—no. Sutures—no! This is an emergency situation. This is no time and no place for the refined surgery of the ordinary operating days in our own hospitals.

Many of the things I will say will be controversial, but bear in mind that we are in an emergency. Let us decide here and now to proceed in only one way, and, without being egotistical, I can say to you that this way will work—it will save lives. Let us not get into controversies as to the relative merits of this drug, or that method, or this dressing; and let us not get off into schisms and dogmas, but proceed along one line.

Yesterday I looked over personally and dressed 104 of these cases in various wards and I saw only one case that had pus. Can you beat that in civilian life? Therefore, I tell you, I know from recent experience and I know from past experience that this works and I recommend it to you as the road to follow:

CLEANSING

Many of these men come in to us in a dirty condition with mud and oil. Mind you how absurd it is to wash our hands for 15 minutes, and to put on a fine clean gown and clean gloves, unless we thoroughly cleanse the area and the wound itself. How do we clean it? With soap and water, more soap and water, and more soap and water, using a brush that is not stiff, or gauze, cleansing the interior of the wound last.

Dry the wound and the part surrounding and coat the latter with iodine. Then you are ready to proceed with your first act of debridement and to find your foreign body.

DEBRIDEMENT

We know that organisms can live only on dead or dying tissue. What is the best culture medium under heaven? Bouillon. And the best bouillon that ever could be is the autogenous bouillon that is made up of tissue, of macerated muscle, and blood, maintained at body temperature in a covered, dark place. We must beat the organisms to it by starving them out. We will cut off their food supply by robbing them of all bruised and devitalized tissue and giving them nothing on which to thrive. That is the basis of debridement.

Debridement comes from the French word, meaning "unbridling." It means excising with a knife or scissors. Excise until three things happen—the criteria of debridement—(1) excise until you get a normal color; (2) excise until it bleeds, and (3) excise until (if it is muscle) it contracts. These are the basic things that go to define adequate debridement. In some cases you may have to cut off 1/4 inch, in others 1/32, but do it so that the outside part is widest. As you get to the depth of your damage you have a V-shaped hole.

Now you are ready for the second act of debridement. There will be some tiny frayed edges around the wound that must be removed. The French call it *épluchage*—"plucking out the feather" edges.

SULFA DRUGS

We dry out our wound and fill it with sulfanilamide or sulfadiazine. When I say fill it, I mean *fill* it.

SUTURE

Do we suture? *We do not suture up any wound completely.* We put in our stitches—silk or gut, or cotton, interrupted. We do *not* tie them, we leave them there. If at the end of three days there is no evidence of infection, no redness, no discoloration, no crepitation, no local or general septic signs, we draw all these stitches together. That is primary-secondary suture, and it is a life-saver. If you would save lives, if you would prevent death, disability and disaster, do not forget primary-secondary suture in civil as well as military cases.

DRESSINGS

Let your dressings be massive. The inner layers should be of sterile gauze, the outer of ordinary cotton; and the latter do not need to be sterile. Resolve to make your dressing a splint. Wherever a joint is crossed by your wound or debridement, support it. Keep it in a comfortable position, in a position of physiological rest.

POSTOPERATIVE CARE

Give a sulfa drug, 1 Gm. every 4 hours for the first 4 days routinely. If they get a toxemia, cut down the drug. Dress them the next day, and don't put on dry gauze. Have it moistened in sterile mineral oil, or equal parts of mineral oil and vaseline, and be sure to have it oily for one or two layers next to the raw surface.

GAS GANGRENE

Suppose 24 hours have elapsed and the wound has a brownish or watery discharge; the tissues you debrided no longer look healthy and red, they look brick red; and when you get your nose down in the wound it smells of dead animals or garlic. Then feel the margins of the wound, and if they are brawny and hard, get a culture to the laboratory immediately. Without waiting for the laboratory report, open the wound wide, for you are on the way to a possible gas gangrene. Remember the local signs:

(1) Discharge, watery and brown.
(2) Brawny discoloration around the edge of the wound.
(3) Smell.
(4) Localized crepitation, although this may be a later sign.

Don't wait for your laboratory report. If these things are present, excise immediately and ruthlessly. Because the gas gangrene organism is a selective one, excise the whole muscle, making a liberal incision because if in the next twelve hours you have not cleared that spot, amputation is your only hope.

At the first sign, anti-gas serum should be used, and the first dose is three times the ordinary dose, just as in tetanus. After that give it every 4 hours or every 8 hours, as the indication may be.

Suppose it is an ordinary pus producer. With or without a laboratory determination as to whether it is a staphylococcus, streptococcus or other infection, use a wet dressing of iodine solution.

azochloramide, or a solution of sulfa drug, 15 grains to the ounce. If there seems to be any burning do not wait; put a pair of forceps in and open it up, *but do not cut.* The knife is an excellent means of producing metastasis, and you may give the patient a blood stream infection if you cut.

AMPUTATION

We are still now in the emergency class. When do we amputate? What are the indications for amputation?

(1) Damage to the main blood supply;
(2) Damage to the main soft part coverage;
(3) Damage to the main neural supply;
(4) Damage to the main osteal structure.

Count out damage that is irreparable—that will not respond either to immediate or subsequent repair, damage in which we know if infection takes place it will kill the patient. Ordinarily the damage is a combined damage, not to the vascular, neural, or soft part supply alone, not to the osteal alone, but to two or three of them. If so, amputate. When? Now. And this amputation is a so-called guillotine, a chop amputation that severs everything at the same level and is left wide open. It is not sutured. This is not the time for plastics. It is a chop amputation and done straight through at the level of your combined fracture, or at the level of the greatest damage to the soft part coverage.

BLOOD AND PLASMA

As an outcome of our round table deliberations, we have decided that as a means of combating shock or hemorrhage, whole blood is the method of choice. If whole blood is unavailable, then plasma is the next best. In burns, plasma is to be preferred. We also give saline, with or without 5% glucose.

PAIN

Do not forget the pain these people have. Courage is not the rare thing with these boys, it is the ordinary thing; and when these boys have pain, do not give them ⅛ gr. of morphine, or ¼ gr., give them ½ gr., and keep giving it to them according to their needs. When an individual is injured in battle, it hurts. Do not forget the psychic effect of lying in bed with your arm or leg gone and listening to an impending attack from above and thinking you may have to take it again.

Let me tell you that if you will follow out the scheme as outlined to you here, you will be rewarded by the saving of life and limb, and by a very remarkable lessening of not only mortality but also morbidity.

DISCUSSION.

DR. STRODE—Regarding chest wounds, in an emergency there is no time to look for foreign bodies. If they are obvious and easily removed, it should be done, otherwise they should be left. In closing the wound put in a tube leading into a bottle of water under the bed. The chest should be aspirated following return from surgery if there is evidence of hemothorax.

There were too many men operated on that day that were in shock. They should have been given blood, saline, and preliminary medication.

I have dressed several hundred of these wounded. We have not had much infection, but I am not as optimistic as Dr. Moorhead. I think in another day or two we are going to have plenty of infection.

I have seen many who have been treated incorrectly. Some were sewed through and through, some were packed with gauze. In a few days, I fear, we are going to have some very severe infections that could have been prevented.

I can only emphasize what Dr. Moorhead said about gas gangrene. The only sign we could detect was an odor and the brownish discharge. No evidence of gas or crepitation, but a characteristic odor which could not be missed.

DR. JUDD. One important thing is the anesthesia. Don't kill these fellows with the anesthesia. In my opinion, if you have no expert anesthetist, give ether by the drop method; it is the safest to give in an emergency. I am afraid of these spinal, intravenous and rectal anesthesias. If you have to use an untrained man or woman, get an open mask, or a newspaper and a piece of towel, and drop in the ether.

This is the third war I have been in. I was sick to see at Queen's Hospital little children and women with arms and legs off. It is a dirty way to fight a war. If we could only get back to the battlefield!

The sulfa drugs are a great blessing, but do not expect miracles of them. They aren't worth a damn if the wounds are not properly treated.

The little tags of tissue Dr. Moorhead spoke of are very important. They are just the things that the bugs want to eat.

Regarding guillotine amputation, I would suggest that you put a couple of silk-worm stitches over the artery, that make a little tension over it. We used to sew a little muscle over the femoral artery to support it. Have a tourniquet at the top end of the bed and teach the patient to use it. If that femoral artery breaks loose, he will die in a few minutes unless he uses it. I am always afraid of the secondary hemorrhage.

BURNS

December 22, 1941

What is a burn? I have for a long time called it an *infected wound due to heat.* If we put burns in the infected class right from the start, it will get us away from the carron oil and smear treatment. You men doing first aid work must recognize the fact that a third degree burn or an extensive second degree burn demands hospital treatment and not first aid treatment.

CAUSES OF BURNS

A burn is an infected wound due to heat; heat generated from a thermal, electrical, chemical, radiation or emanation source. The three commonest sources are flame, contacts and scalds produced either by liquids or hot metals.

Electric burns are not primarily due to electrical contact; mostly they occur from an arcing contact. Many people believe that electricity produces a particular type of burn. My experience is that it does not. If I had my choice I would take the electric burn because it is a cautery type of burn, the kind we use in therapy. Electric burns, while they are ordinarily third degree, are relatively painless, and are the most harmless from the standpoint of immediate symptomatology and eventual outcome. It is the clothing catching fire in an electric burn that causes the multiplicity of burns.

Burns among children are likely to be of very lethal character because children do not do well with certain burns. Women do very badly also. Not so much that they cannot stand the shock, but because of the type of clothing they wear.

PATHOGENESIS

Burns can be divided into three stages: redness, inflammation; exudation; and healing, or cicatrix stage.

I do not know anything that is more characteristic from a pathological standpoint than the manifestation of burns. Nature resents an assault from any external source. She gets very angry, she swells up and gets red and causes pain; the surface is hot. After the anger subsides, being very feminine, she weeps and we have the stage of tears, exudation. After that the tears dry up and she carries the scar. That is just as true of typhus fever, pneumonia, grip or a cold in the head as it is of a burn. Nature reacts in those three ways wherever she is irritated or assaulted.

MANAGEMENT

First degree burns—the minor degree, the superficial degree—are characterized by the ordinary signs of inflammation, p.h.s.—pain, heat, and swelling. In the first degree burn the shock element is out. Treatment is any kind of wet dressing. Bicarbonate of soda, 5%, is my favorite, if it is available. Mineral oil, if fresh, is good. These burns do not concern us much, but be careful about patients who may also have inhaled flame. Look out for bronchial symptoms.

Second degree burns are characterized by signs of first degree burns plus weeping and exudation of serum. If that serum becomes infected, as it will by surface organisms, we have pus. I have a rule never to bother a bleb until it interferes with my dressings. When the time comes to puncture it, do not puncture from the top, it should be punctured from its base. It must be done aseptically, after coating with iodine. Let the sound tissue level be your guide. Push it free from your base and not from the top.

Treatment: Second degree burn is an infected wound due to heat, with a break in the skin. Wash it off, with gauze sponges, soap and water, followed by plain water. Put on an aseptic dressing. Vaseline gauze is good; mineral oil is good, if you are sure it is clean. And remember to force fluids. If patient is in pain, give something to stop the pain, ¼ or ½ grain of morphine, if necessary. One of the best ways of preventing subsequent shock is by giving a larger dose of morphine.

When we come to the next class, the *third degree burn*, we are getting into the lacerated, extensive wound class, and we have now particularly an ulcerated surface to deal with. If it is a localized third degree burn, it is a hospital case. If it is a generalized third degree burn, it is doubly a hospital case. Put on a primary sterile dressing, and get these patients to the hospital. At the hospital the burned area is washed off with soap and water, and the patient should be under an anesthetic—a big dose of morphine, and an intravenous anesthetic. Debride. Take off the raw surfaces of the skin. Render that surface just as clean as if you were trying to render clean a lacerated wound deep in the tissues. Put on a dressing of a sulfa drug, in vaseline on gauze; or 15 grains to the ounce in mineral oil. Keep that surface covered unless there is some indication for changing it. Pain, odor, discharge, or elevated temperature are indications for changing the dressing within three days.

SHOCK

This patient has shock, or will get shock There are two kinds of shock. The first kind

is immediate, directly after the accident; secondary shock is within three to four days, or it may be delayed for ten or twelve days, principally in children. If you have plasma, give it by all means. Plasma should be given in divided doses, 300 to 500 cc. and repeat. Saline, glucose, are all right, but plasma is the thing. Do not forget to treat pain, too.

A lot of work has been done in regard to the cause of shock in burns, and several different theories have been advanced. What the actual basic cause of the shock in burns may be, does not concern me; it is the fluid loss which occupies my attention. The shock which occurs between the 10th and 14th day is said to be due to the absorption of toxic material from the burned area. Various estimates have been made as to the ratio of burn area to the surface of the body that will result in a fatal burn. I have known burns to be fatal when they involved very small parts of the body, and I have known some cases to survive when large areas were involved. I doubt very much if anyone can estimate it in terms of inches. It is not so much a matter of inches as it is a matter of the intrinsic shock with which it is associated.

COMPLICATIONS

For first and second degree burns on the face, start your patient chewing gum; it will help prevent contractures. Prevention of contractures is very important. In any burn, anticipate contracture and force patients to make motion. Force them to angulate. Don't forget to give fluids by mouth as well as by any available method that is possible. Do not forget the advantages of immersing extensive burns in a tub containing a solution of bicarbonate of soda. Tub treatment is also good for taking off dressings; for soaking them off. Dressings should be patted gently until soaked off.

Other complications are of the G-I type: nausea, vomiting, bloody bowel movements. Along about the second week, ulcer of the duodenum or jejunum sometimes occurs. Kidneys sometimes become affected. Painful, adherent scars and definite contractures are later serious complications.

A localized third degree burn is a very clear indication for early excision and immediate grafting with pinch, sliding, or Thiersch grafts. When it comes to the stage of giving treatment for the contractures, we have various treatments, but we do not attempt to do the plastic work in the period of activity. In our organization we have a code:

1st to 4th day - primary period.

4th to 8th day - infected period.

9th to 12th day - period for elective operation.

In the first period, everything is red hot—no elective surgery. In the second period—hands off. The third period is for surgery.

FIRST AID

There are dozens of things that are used for burns, but with simple and perfectly ordinary treatment, the first and second degree burns will respond well if we do not infect it. The third degree burns are potentially major casualties and should be given hospital treatment. They should be regarded as exudative, lacerated wounds. The most necessary thing for those cases is debridement and sterile dressing. Much has been done in regard to shock treatment in burns and shortly we may be able to avail ourselves of some of the laboratories' findings.

TANNIC ACID

Personally I have always objected to an occluding dressing on any exudating surface. Tannic acid on first and second degree burns I think is excellent. In third degree burns I do not like it. My selective treatment for first and second degree burns is bicarbonate of soda, and for the third degree I prefer the sulfa drugs. Besides tannic acid in the first and second degree burns there are the various dyes,—gentian violet, methylene blue, mercurochrome. I do not care much what is used so long as it makes a non-occlusive and aseptic dressing.

SUMMARY

Let me leave this with you—a burn is an infected wound due to heat, and if we would prevent the effects of burns and shock, let us realize that third degree burns demand that same type of debridement we found so useful that Sunday morning. Let us also realize that these third degree burns are hospital cases and that they should be accorded the same type of operating room treatment as any other form of traumatic surgery. And do not forget to stop pain and make sure your patient has an abundance of fluids. And when the time comes to combat shock, I should say that almost specific treatment is to use plasma in preference to any other form of blood, either whole blood or blood derivative.

TENDONS AND NERVES

Tendons

In any trauma or injury to tendons let us remember what we have from an anatomical standpoint. A tendon is the lower end of a muscle. Its characteristics are (a) great holding power; (b) ability to withstand trauma and infection; (c) capability of a very considerable degree of re-education. In all the tendon injuries we meet in civil and military life, those to the tendons of the hand and wrist are the most serious. There are no less than 28 tendons crossing the wrist joint.

In making an attempt at tendon repair, do not do it by the clock. The operation is formidable and time-consuming. When you are operating in the neighborhood of the wrist joint do not hesitate to have anatomical diagrams before you and if you are operating on the bones of the wrist have a skeleton there.

First, let us take *tenosynovitis*. This is due to violence often repeated, rather than one single trauma. Pain, swelling, tenderness and a very peculiar crepitus are the signs. Do not forget to use your stethoscope, it can bring out a crepitation many times.

This may lead to formation of a *ganglion* on the dorsum of the wrist. This is due to multiple or repeated trauma and only in rare cases to single trauma. It may be a painful process. It may disappear spontaneously, but it may also recur after it has once been removed. It may be single or multiple and it may contain so-called "rice bodies." This does not, however, indicate a tuberculous process.

Treatment: Rest, elevation. Place a pad of gauze over the ganglion with straps. Arrange the straps spirally so they do not act as a tourniquet. If this is not effective, try the time-honored method of smashing it. Use a good heavy book. It is a good idea to daub it with iodine, so you do not miss it. As soon as it goes, put your thumb on it and do not let up on the pressure until you can put a felt pad on it. If this does not do it, aspirate with a fine needle, using novocaine to anesthetize the area. If this method is not effective, inject a sclerosing drug, one of the morrhuates. Iodine is good. If none of these help, use excision. Be sure to make an incision that will be perfectly adequate and do not make your incision straight, make it curved. Do it aseptically. Be careful of the tendon sheath. Remove the ganglion as completely as possible and if you are in doubt as to whether it is single or multiple, mark the tendon so you can get the contents completely expressed.

Lacerated tendon. Regard this as a general rule: If the tendon sheath becomes necrotic, the action of that tendon is very badly compromised. In an infection of the hand with involvement of the tendon sheath, bear in mind that the function of the finger, or of several fingers, is very likely to be permanently compromised. The size of the wound is no index to the extent of the damage. Remember you have 28 tendons in the wrist, arranged in several layers.

Treatment: Before you anesthetize, stop the bleeding, put on a sterile dressing and make a test of what the finger can do. Do not forget to look for an indwelling foreign body. Get the history. Were there small pieces of glass, or large splinters? Test the patient for four things: (a) flexion of the individual joints; (b) extension; (c) abduction of the individual joints; (d) sensation.

This is no office case, it is a hospital case if there ever was one. Remember you are operating on a human hand. Of all the surgery that is done badly, surgery of the hand is the worst.

If you do a primary suture, remember you do it only if it is within the first six hours. We know that if we do not take care of our cases within the first six hours, infection beats us to it. Remember, we go to the operating room. We place a pad of gauze over the wound and cleanse around the wound with soap and water. After the surroundings are clean we go into the wound and all over it, using gauze or a sponge. Do not scrub with a rough brush. Dry, paint edges with iodine and proceed to debride. How much? Not in terms of inches but in terms of damaged tissue, until you get to the foreign body or to the depth of the wound. Again the criteria are: (a) tissue looks normal; (b) it bleeds; (c) if it is muscular tissue, it contracts. If it is a two-way wound, debride one side, then the other, and clean it out with a piece of gauze—a through and through debridement. Stop hemorrhage. Put sulfanilamide in the wound. Do a partial closure, put in your sutures and let them go until the third day. If the wound is wide do not contract the tendons until you have tied a small piece of black silk on them so they do not get away from you. If it slides up in the tendon sheath try using a pair of forceps. If that fails, make an incision higher

up. Use silk, relatively fine, or cotton sutures. Try to make your sutures come end to end, but if your end to end approximation is not satisfactory with the limb out straight, flex it. Tendons stand suturing very well. Rest the wound by a heavy dressing and use a splint that will give it support. Some people remove the splint in 24 to 36 hours. I do not. I take it down at the end of five days. Do not try motion until the fifth, sixth or seventh day. The patient can wiggle his finger, but actual motion should be reserved until later.

Other tendons that may be involved are *biceps tendons, patella tendons,* and the *Achilles tendon.* The tendo Achilles has the best prognosis of any tendon.

As for the bigger tendons, if they are separated it is quite a task getting them together again. An "L" shaped incision or a "Z" incision will give almost any length you want. Use silk also in these larger tendons. If a tendon is gone altogether, take the adjacent tendon, split it, and splice it to the other.

Nerves

What we have said regarding tendon repair also to a great extent applies to nerves.

The differential diagnosis between neuritis, arthritis, myositis is made on the basis of the history. Was it direct, indirect or muscular violence? Was pain generalized or localized? Is the tenderness focal and local, or is it general and vocal? This is most important to know. If it is local and focal, and you get it along the nerves, you have a *neuritis.*

We get *neuromata* after infections, amputations, etc. They are difficult and painful, and hard to control. After you have run the gamut of treatment, you may come to believe that the Criche operation is the best. It has a notable place in the axilla and in the femur. A segment of the outer coat of the artery is stripped off. That often stops pain immediately.

In *neuritis* the symptoms are pain, swelling, local tenderness, disturbance of sensation. In neural manifestations there is a very definite pattern and it is definitely geographical. One of the earliest manifestations is atrophy. There is definite wasting when there is sciatic involvement.

Treatment. *Without wounds* the treatment is rest, posture, splintage. Certain anodyne drugs are helpful. Physiotherapy sometimes is very helpful. In treating neuritis *with* wounds you must decide if there is radial involvement. In trauma of the upper extremity never fail to try for two things: (a) radial pulse and (b) vitality of the radial or musculo spiral nerve. Find out beforehand if the wrist can be elevated. In trauma of the lower extremity find out (a) is there a dorsalis pedis, and (b) can the ankle be flexed and extended?

You must know these before treatment is instituted. If it is within the Golden Period, cleanse, debride and suture. If for any reason you think the nerve should not be sutured now, tag it with black silk so you can find it later. Suture within the six hour period, with silk, and do it delicately. You cannot be as rough with this as you can with a tendon. Above all, have no tension. If around the elbow, you may have to flex it greatly even to the point of interfering with circulation, then let up a little bit.

Suppose it has not been sutured and becomes infected? Do no plastic work on these. Wait six weeks *plus.* Make manipulation on the wrist, and if you get no cellulitis it is reasonably safe to go in. If you have given tetanus antitoxin and you suspect tetanus, give a second dose 24 hours before operation. If you have any doubt about the state of the previously infected wound, use sulfanilamide in the wound.

Period of regeneration of nerves is as follows:

Musculospiral (radial)	5-14 months
Ulnar	5-16 months
Medial	8-15 months
Sciatic	12-22 months
Peroneal	10-16 months
Tibial	11-17 months

One of the first signs of regeneration is called Tinnell's sign—tingling at the site distant from the lesion. Trophic signs come back at about the same time. Motor signs come back last. Do not despair if you do not get results in nine to twelve months, even later. It is a slow process.

Can a motor nerve be transplanted? Can I take a sensory nerve and transplant it to a sensory nerve and expect it to take? It has been done in the laboratory and sometimes in the operating room, but not with such success that I would recommend it. In such cases I advise a tendon transplant. Can one take the proximal end of a nerve and put it into the muscle which it supplies? This can be done and sometimes it will work,

but it has not happened often enough to give it as a precept to follow. In nerve loss, the best procedure is not anastomosis, not nerve transfer, but a tendon transfer.

I again would emphasize that in all these open wounds, cleansing is the most important thing; then debridement; then primo-secondary suture. Nothing is more important than a clean field.

SPINE INJURIES

Today we will talk about the closed cavity which we call the spinal canal. Let us get the anatomic basis of this structure and see how it is built.

The spinal column, as I emphasized yesterday, is simply a series of joints, and these joints are clothed and covered with certain structures which are familiar to us. A fracture of the spine without intrinsic cord damage is just as much a curable condition as fracture of the neck of the femur; in many cases it is much more curable.

There is a zone of incidence in connection with fracture of the spine. Uncomplicated *dislocations* of the spine occur only in the *cervical* region, particularly in the upper zone. Most of our dislocations in the cervical zone come below the third or fourth cervical junction.

In the *lower* spine we are concerned chiefly with *abnormalities*: 1) a failure to close (spina bifida occulta), 2) lumbarization of the 1st sacral vertebra, 3) sacralization of the fifth lumbar vertebra, 4) a short transverse process, and 5) a narrow transverse process. People with abnormalities of the spine, when subjected to trauma, are not likely to have any more after-effects than if they were built along normal lines.

When we get to the *dorsal* level, we get into the great zone of *fractures*. This region may be subjected to backward, forward, sideways, or rotating violence. In the vast majority of these cases injury results from forward bending violence. Bones break where they are weakest, where they are thinnest, where their structure is most vulnerable. They break where the curve changes. Bones break in terms of the same physical laws that govern the breaking of a piece of wood.

What is there in the make-up of a vertebra that makes it so vulnerable? These bones are honey-comb in structure, and the blood supply is not good. This is a structural defect which makes for a lack of that solidarity that we find in a long bone. Fractures of the spine do not occur as a result of direct violence. There are two clinical kinds: with, and without, cord damage. We can break the box without damaging the thing within it. The extent of the fracture is no guide to the extent of cord damage. Often with a minor fracture there is much cord damage, sometimes there is no fracture and much cord damage. I suppose that there is such a thing as concussion of the spinal cord, but I cannot rationalize it. Most of us believe that it is a misnomer, it should be called contusion of the spine.

The order of incidence of fractures of the spine are: 1) body of the vertebra, 2) transverse process, and 3) spinous process. Be careful when you read your x-ray that a gas bubble has not interposed itself and thrown a shadow. Injury to the transverse processes is not of great importance. They heal by fibrous union. They should not be subjected to surgery, since they will do well enough by themselves.

Fracture of the body of the vertebra. History of bending violence, as in automobile accidents or in diving. It is not necessary to have extreme violence to produce a fracture of the body of the vertebra. Forward twisting; backward twisting; anything that is capable of producing a jack-knifing effect; and if the violence is extreme, the vertebra may collapse and give a compression fracture.

Fractures of the transverse process are avulsion fractures. In the diagnosis of this, or any of the fractures, the history is a great aid. Examination: Swelling, ecchymosis, localized tenderness, spasm of muscle, perhaps crepitation, perhaps false motion. Do not be content with fore and aft X-rays—do a lateral. In some cases do not be content with just two: go "around the clock." You will be amazed to see the evidence of fracture you can pick up that way.

The diagnosis has been made, and the patient has been brought into the hospital. Now in a suspected fracture of the spine, as in any other fracture, try to put the patient into a position that will do the least harm in transport. When the patient picked up in the street says "My legs are asleep," turn him face down. If his arm is asleep and he has difficulty turning his head, leave him in the position in which you

found him. Do not attempt to correct the deformity—forward, backward or lateral— that this patient's head may be in, until you get him into the hospital. The first thing to do in the hospital is not to be too active in attempting to make a diagnosis. Do not put your patient on a stretcher and attempt to bring him to the X-ray room. Run your hand along his back, and if you find a sore spot, that is enough. Suspect and expect a compression fracture of the vertebra. What do you do? Try to convert his position into exact opposite of how you found it. Arch the back—over-correct it, I don't much care how, with bolster, pillow, or Gatch bed (reversed so that feet are at the head end). Keep him there until you demonstrate that your alignment is all it should be. At the end of ten days put him in plaster. The plaster should go below the dorsal level, up high. When putting on plaster, encircle the last two segments of the spinal column; make it a very complete encirclement. Pad so that there will be no pressure over the spinous processes. He wears the plaster eight to ten or twelve weeks, and he may get up and walk around. Then put on a Taylor brace. Before the plaster comes off he can do certain exercises, such as deep breathing, or carrying a weight on his head. This is done to keep the muscles active and to keep circulation active. The prognosis is good in well-reduced cases. In unreduced cases there will be a certain lack of conformation. In some cases there will be a spondylolisthesis. In general the prognosis of uncomplicated fracture of the spine is excellent. If there is a great deal of knuckling, use traction. This is kept up until you can substitute plaster of Paris.

Intraspinal injuries. These are dangerous, and may be two kinds. In one there is immediate, total loss of motion, sensation and visceral control at and below the level of the lesion. The other kind shows partial loss of these, with gradual recession. The second kind we have great hope for; the first one, not so much. In fracture of the spine with cord involvement, I have rarely seen a laminectomy do any good; it should be used only as a very last resort. If the patient was not benefitted by closed correction, he will almost never be benefitted by laminectomy. The best single indication of level of lesion is the zone of hyperesthesia.

With involvement of the bowels and bladder, the patient should be put on an air bed or water bed, to help prevent decubitus. We also try to avoid this by particular nursing care and by keeping pressure off the heels, malleoli, and sacral regions. We sponge them off with alcohol. Remember the doughnut on which to support the heel. Remember the possibility of preventing decubitus rather than having to cure it after it does arrive. In the care of the bladder, I prefer spontaneous overflow, or if necessary frequent aseptic catheterizations or indwelling catheter, with tidal drainage if you have the apparatus and some one to watch it.

SKULL INJURIES

December 29, 1941

Skull injuries are of two classes, like those of the spine, without intracerebral damage, or with intracerebral damage. I said yesterday that the extent of the external damage to the spine was no indication of the seriousness of the damage done; I say the same thing even more emphatically in regard to skull injuries. In any closed cavity, the external evidence of injury is no accurate measure of what has gone on within. In a linear fracture of the skull, the individual may be unconscious, temperature rising, there is every evidence of intracerebral concussion, yet your external examination may reveal almost no external evidence.

There is a zone of incidence in skull fractures, as in spine fractures. In the skull the frontoparietal region is most vulnerable subject to injury. We divide this zone into two sections, the vault and the base. Eighty per cent of fractures of the skull lead from the vault into the base, and eight or ten per cent lead from the base into the vault, so that when you get a fracture of the skull and your X-ray begins to show that you lose your line after it gets down below the parietal base, don't think that you have the end of it. The frontoparietal-temporal combination is the most common for the vault; for the base the middle fossa is the most common zone of incidence.

There may be a simple crack (linear); there may be the comminuted type. There may be the depressed type, and if this type is carried through to operation we find that the depression is more marked on the inner table than on the outer table.

Method of examination: We can do a good deal in examination if we go over the head the

same way we go over the abdomen. First of all, it helps a great deal to shave the entire scalp. It will bare the surface so that you will not be looking through a fog. We look for any irregularities; for hematoma; for scalp ecchymosis. This is one of the best signs of fracture. Ecchymosis is pathognomonic of fracture when it is 1) late in onset; 2) distant from scene of trauma, and 3) geometric in outline.

Palpation: Make it a bilateral palpation, all over the head. Any irregularity? Does it "give" when you press? *Percussion.* Use the stethoscope. Do you get a tin-pot, broken type of sound? (This is in the unconscious patient, of course.) Any hemorrhage in the ear? Any dried blood in the nose? Any curious looking whitish material coming out of the ear? If it is 48 hours later, any evidence of discoloration of the conjunctivae? If this is limited to conjunctivae, probably it is a basal fracture. Hemorrhage from ear is nearly always pathognomonic of fracture.

A patient comes in and says he was knocked out; saw stars; was sick to his stomach; does not know how long he was out. He went home dizzy, lay down and fell asleep. He slept half an hour, woke up and began to feel drowsy. After that he noticed he could not use his hand and after that he cannot remember much. That is a classical manifestation of a blow on the head with slow hemorrhage.

What is *concussion?* Concussion is supposed to be due to a shake-up of the cerebral contents. Beyond that people differ; some say it is from many minute hemorrhages. How do we know we have it, and what are we going to do about it? With concussion there is an immediate onset of unconsciousness, complete or incomplete, usually associated with nausea or vomiting or both. If you get this history, watch that patient for at least three days. If you do not, the patient may become comatose in 48 hours and die before you can help him. In cases that give evidence of head injury or are said to have fallen, an attitude of caution is important. If we get concussion signs, let that put us on our guard.

Compression. What are the compression signs from? Blood, bone, or foreign bodies. Localized compression motor signs and sensory signs. Eye signs: pupillary changes; dilation of the pupil; ordinarily the pupil dilates on the side of the lesion. Temperature change: rising. Pulse change: slowing. Respiratory change: slowing. Blood pressure change: rising. How much on guard ought we to be about these things? Get a neurologist to take a look; get an eye man to take a look. Now comes the question: Has he a fracture or has he not? Shall we X-ray? I do not much care whether you X-ray or not. You can tell from other signs. X-ray cannot hurt the patient, if you do not have to lift him; but I do not think it is necessary in most cases.

Incidentally, do not try to make a differential diagnosis between hematoma and a depressed fracture. It cannot be done, and it will not help anyway. If in doubt, incise the hematoma. Do you see a fissure? If you can rub the fissure clear of blood and it stays relatively clear for a short period, it is truly a hematoma. If blood wells up immediately, that is a fracture. That sign is not always positive, but it is good.

I will have no part of anybody who uses routine treatment for cases of suspected oractual fracture of the skull. In the old days at Bellevue we used to give these cases mag. sulph. by rectum, to decompress them. Then along came Cushing with his decompression operation—hole in the roof to drain the basement of the house. A head case, of all cases, should be *individualized and watched* with the greatest kind of care. It should be watched for progression of symptoms due to the only thing that can harm him: an effusion of blood. If it gives him generalized signs you cannot do anything for him; if localized signs, you can.

Indications for operation in fractures of the skull are quite limited. Decompressed fractures of the skull need nothing done immediately. Do not operate while the patient is in shock. Bleeding cases need immediate attention. With foreign bodies (bullet wounds, etc.) do not go in immediately unless there is some indication for it. The only one of the three that demands immediate operation is the bleeding case.

Operative procedure: Make a small hole to take a look. Is there a clot right under it? Is the dura a nice pearly color or is it dark? Is there pulsation? If the dura is lusterless and so on, enlarge the hole; if it is still lusterless, open the dura. Does a clot of blood come out? If you have an accessible vessel that you can catch with a clamp, cautery or stitch, get it. Suppose there are fragments of bone, are you going after them? Be very careful. Put a soft rubber catheter down and with a syringe wash it out very gently. Sew up the dura, sew up the scalp, and put a

drain to the surface. A pipe cleaner drain is good, or a piece of rubber tube; but do not stick it into the brain. Let it stay for 24 to 48 hours but no longer.

Subdural hematoma is another operative case. Usually manifestations are late. Diagnosis is made from headache, dizziness, reflex changes, eye signs, minute hyperesthesias. Be suspicious, be careful about these cases. Have adequate consultation. Go in on one side, and if you do not find anything, go in on the other side.

Spinal tap? They say, yes, do a spinal tap, it will be diagnostic and therapeutic. I say if you cannot make a diagnosis without spinal tap, you had better go back to school. Spinal tap is therapeutic, it is used to reduce pressure if rest and other means do not do it. Never do it with the patient in an upright position. Have the patient's head low. It it best to do it in three test tubes, so you can rack them and see what your proportion is. How much do you take off? It depends on the pressure behind. How often? I like to be very conservative about doing it at all.

All right, you say, you do not go into their head or their spinal canal, what are you going to do? You treat them for shock, and just sit by and watch. Why? Because I am old enough to judge the results. I say "hands off" in the majority of these head cases, and no rushing in for operative purposes on the skull itself or by spinal tap. Rest, sedation (bromides and chloral). Do not forget to give bromides by rectum. Keep a proper fluid balance and give them rest. I am not radical in regard to the skull situation. It is not rational to recommend a perfectly definite routine for every case of head injury.

The sequelae may be headache, dizziness, insomnia, tinnitus, psychoses, fits. Some people recommend intraspinal injection of air on the theory that the air dissects the adhesions apart. I do not like it. I would be very careful about it, especially in compensation cases. Do not produce a piece of surgical pathology to cure a piece of traumatic pathology. You may make the patient worse.

Epilepsy does occur in these cases but it is not common. From war statistics we know that epilepsy is relatively rare following trauma. We know the incidence of epilepsy and also the infrequency of it as a traumatic sequel.

Can traumatic insanity be mixed up with a "four plus"? It can. Can a trauma activate something that may have been going on before? It can. How often it may occur is hard to say, but traumatic insanity in the absence of syphilis is very rare.

What about plastics for the repair of defects? Do people nowadays put in plates of metal? No; a piece of tibia, or rib cartilage is preferred. There are two operations, both very satisfactory.

We have the greatest incidence of fatalities in skull and spine cases within the first 48 hours. If your skull or spine case is going to die of that injury per se he usually dies in 48 hours.

A SURGEON'S PRAYER IN WARTIME

God of Battle, grant that the wounded may swiftly arrive at their hospital haven, so that the safeguards of modern surgery may surround them, to the end that their plan is assuaged and their broken bodies are mended.

Grant me as a surgeon, gentle skill and intelligent foresight to bar the path to such sordid enemies as shock, hemorrhage and infection.

Give me plentifully the blood of their non-combatant fellow man, so that their vital fluid may be replaced and thus make all the donor people realize that they, too, have given their life's blood in a noble cause.

Give me the instruments of my calling so that my work may be swift and accurate; but provide me with resourceful ingenuity so that I may do without bounteous supplies.

Strengthen my hand, endow me with valiant energy to go on through day and night; and keep my heart and brain attuned to duty and great opportunity.

Let me never forget that a life or a limb is in my keeping and do not let my judgment falter.

Enable me to give renewed courage and hope to the living and comfort to the dying.

Let me never forget that in the battles to be won, I too must play my part, to the glory of a great calling and as a follower of the Great Physician. Amen.

Xmas Night, 1941
John J. Moorhead
Col., M.C.

Observations on the Treatment of War Wounds

Made at Tripler General Hospital Fort Shafter, Honolulu

J. E. Strode, M.D.

Honolulu

Experience is a great teacher, and the catastrophe that occurred on this island of Oahu on December 7 was no exception. I have been asked to discuss, for the benefit of those who did not have the opportunity of treating the wounds of this date, the things that impressed me as important to remember when suddenly confronted, unexpectedly or otherwise, with a large number of war wounded.

On the morning of December 7th, I was listening to Dr. Moorhead's lecture on burns, which began with the prophetic quotation, "Therefore be ye also ready, for in such an hour as ye think not, the son of man cometh". Bombs were dropping at that very moment over Pearl Harbor, and the injuries about which he was talking were occurring in quantities.

Preparedness

A well-organized smoothly-running team is as important in efficiently caring for war wounds as it is on the football field in scoring touchdowns. As Dr. Judd has aptly put it, the time for confusion is before the shooting starts and not after.

Hospitals properly prepared for casualties should have, in addition to a well rounded-out staff, supplies of material readily available—many times the amount needed for normal times. It is surprising how rapidly supplies disappear, for the wounds are frequently multiple and frequently of great size.

Classification of Cases

Patients should be admitted to the hospital at one portal of entry if at all possible, so that their injuries can be quickly examined and their disposition made without unnecessary delay. There is no word in the English language to accurately describe the duties of the individual assigned to this job but the French call him the "*triage*" officer. The term, so far as I can learn, means the one who does the sorting. He should be a surgeon of the widest possible experience and with the soundest possible surgical judgment. No assignment on the surgical staff should be made with greater care.

All injured patients on entering the hospital fall into one of five categories:

(1) Those needing treatment for shock.
(2) Those in need of minor surgical assistance.
(3) Those needing major surgery immediately.
(4) Those needing surgery later or not at all.
(5) Those beyond surgical assistance.

As can be readily appreciated, this is a flexible classification, since the individual being treated for shock, for example, may soon fall into one of the other categories. The *triage* officer should quickly but accurately survey the injured individual, write on his forehead in mercurochrome the number—1, 2, 3, 4 or 5—to designate into which of the above described categories he falls, and an assistant should attach a card to the patient's wrist on which is written the patient's name, preoperative medication or orders and recommendations as to his further treatment. If the patient goes to surgery, the opposite side of the card may be used to describe the operative procedure and postoperative orders. It is appreciated that this method may not be the best one but at least it has the advantage of simplicity.

It must not be forgotten that many of these individuals have multiple injuries and the one that is of greatest magnitude and most apparent may by no means be as important as one that is difficult to discover. For example, a large flesh wound of the buttocks may so arrest one's attention that a small penetrating wound of the abdomen or chest may be entirely overlooked. The lesson to be learned is apparent: *Have all individuals prepared so that the* triage *officer can inspect the entire body without difficulty and without delay.* This necessitates a staff of individuals trained for this purpose.

Handling of Patients

When possible, it is best not to remove the patient from the stretcher on which he is placed when first picked up until he is finally deposited on the bed on which he is to remain. It has been found that many major operations can be carried out with the patient on a stretcher, the handles being supported by wooden "horses" at each end. During treatment for shock the patient should be left on the stretcher. A convenient height for "horses" is 32 inches, but for shock treatment

the foot end of the stretcher should be raised 6 or 8 inches higher. Many of these back-saving devices should be scattered about the hospital corridors and shock wards and around the operating rooms.

MANAGEMENT OF SHOCK

It is extremely important that individuals in shock be given appropriate treatment for this condition by the use of heat, morphine, oxygen, and intravenous infusions of saline, plasma or blood before they are subjected to surgery. If any large number of injured are to be cared for, it is important that a special ward be designated for this purpose and that its staff be especially competent to administer such treatment. It is apparent that adequate amounts of apparatus, such as infusion and transfusion sets, arm boards, tourniquets, stands, sets for cutting down on veins in addition to ample amounts of saline, saline and glucose, plasma and whole blood, be on hand for this department to function. Teams versed in an acceptable method of treating burns may well carry on with shock treatment, since their methods of therapy have so much in common.

PREPARATION FOR SURGERY

It is important to treat shock before the patient reaches the operating table in order to prevent unnecessary delay in the operating room. It is also equally important to have the patient prepared for surgery in advance whenever this is feasible. Wounds should have been gently cleansed with soap and warm running water, unnecessary clothing should have been removed and necessary areas shaved. The desirability of apparatus to supply running water with receptacles connected by hose to the drain pipes so that no time is lost in changing basins of soiled water for fresh water is readily apparent. All preparatory measures should have been completed before the patient reaches the operating table to prevent the loss of valuable time by the surgical team.

ANESTHESIA

Ether anesthesia, by the drop method, lends itself well to this type of surgery. It has the advantage of safety and, in addition, it may, when necessity demands, be given by those with little training.

FUNDAMENTAL PRECEPTS

Dr. Moorhead recently gave us an excellent course on traumatic surgery and all who heard and heeded his lectures are fully aware of the principles governing the treatment of the war injured. A brief reiteration of the fundamental principles covering the treatment of wounds as laid down by this eminent teacher cannot be too often repeated.

(1) *No person in shock should be subjected to surgery* except for control of hemorrhage or some other dire emergency.

(2) *All accidental wounds are infected and should be treated by*:

(a) *Thorough cleansing* with soap and water, soap and water and more soap and water.

(b) *Thorough debridement,* with removal of all devitalized tissue until there is:
Normal appearance of tissue.
Bleeding.
Contraction (in the case of muscle).

(c) *The entire wound should be covered by sulfanilamide powder,* or alternatively by sulfathiazole powder.

(d) *No wound should be closed.* Stitches may be placed, to be tied at the end of the 3rd day if no infection is present; or the wound may be left without sutures.

The very few infections (less than 1%) that occurred in the large number of wounds treated convinced me of the effectiveness of this procedure.

CHEST INJURIES

In chest injuries a few fundamental principles should be remembered.

(1) Defects in the chest wall should be immediately sealed to prevent serious interference with the cardio-respiratory mechanism. Packs of moist sterile gauze are usually most readily available, though a large square of rubber tissue dam placed over the opening is better since air, blood and exudates are forced out of the pleural cavity on expiration and prevented from entering on inspiration. If there is serious hemorrhage it usually comes from a severed intercostal vessel, or, less frequently, from the internal mammary artery. These bleeding points should be ligated immediately. Hemorrhage from the lung usually ceases spontaneously. Hemorrhage from the large vessels in the mediastinum does not lend itself well to control, and usually proves fatal before or shortly after the patient reaches the hospital.

(2) Rapid debridement of the wound with removal of easily accessible foreign bodies and sucking out of blood from the pleural cavity should be done if the patient's condition justifies it. It may be necessary, in order to save the patient's life, to do this subsequently even though it invites infection. When possible, the wound in the chest wall should be sutured tight after application of an adequate amount of powdered sulfanilamide to the wound and interior of the pleural cavity.

(3) On return to the ward, two immediate complications should be expected and frequent examinations made to detect their onset:

(a) Hemothorax — treated by aspiration and replacement by an equal amount of air.

(b) Tension pneumothorax—treated by a water-sealed catheter introduced anteriorly in the 2nd or 3rd interspace in order to be away from the blood which usually complicates such injuries. This probably should be done routinely in all chest injuries before they leave surgery.

(4) Infection resulting in empyema or lung abscess is a later complication and can be dealt with in a more leisurely manner, should it occur.

(5) Mediastinal emphysema causing cyanosis and respiratory difficulty may be occasionally encountered. An incision into the superior mediastinum above the sternum may relieve the condition, though it is frequently associated with injury to other vital structures making the prognosis grave.

Injuries to the chest are the only ones where a closed system of anesthesia may be desirable in order to expand the lung before closing the chest wall. In the absence of pressure anesthesia, subsequent aspiration of the chest is desirable to aid in expanding the lung.

A bulletin briefly covering the salient features of the emergency treatment of chest injuries, along with a description of the simpler apparatus found useful, is now being compiled by a committee especially interested in the subject. This information will be distributed to each physician in the Territory.

ABDOMINAL INJURIES

Abdominal or suspected abdominal injuries should be looked for immediately if the patient is not in shock, or as soon as the individual responds to shock treatment. If reasonable doubt exists as to the presence of an abdominal injury it is better, if the patient's condition justifies, to explore than to wait until the findings make the diagnosis certain. Be on the lookout for visceral injuries even though the point of entrance of the missile is remote. Never conclude because the portal of entry is small that the extent of abdominal injury is small. Have a systematic method of rapidly and gently exploring the abdominal cavity. It is probably best to start with the stomach, rapidly surveying the region of the liver, spleen and duodenum; then drop down, expose the jejunum, and follow the entire small gut to its termination; then in turn the large gut, not forgetting as one passes along, the ureters, kidneys, vessels in the mesentery, and urinary bladder. It is better to close multiple bowel perforations, if the blood supply is adequate, than to do a resection. Silk on round intestinal needles is the suture of choice. Eight or ten grams of sulfanilamide scattered about in the abdomen should be a routine procedure. There is rarely any indication for drainage in such cases. Even though the damage to the abdominal viscera is extensive, a conscientious and determined effort should be made to repair the injuries for it is surprising to see recovery take place, not infrequently, in an apparently hopeless case. This method of procedure is desirable and the only one that will prevent overlooking injured organs, but all desirable methods have to be modified to fit the individual patient.

AMPUTATIONS

Amputations make up a large percentage of the emergency operations in the present war injuries. In selected cases, where the patient is not in shock, where there is a single injury and the patient is received early under good operative surroundings, one probably is justified in doing an elective type of amputation: that is, at the site of election, with flap and primary suture. However, the vast majority of such injuries are received under adverse circumstances, in which case a guillotine type of amputation seems advisable. All structures are cut across at the same level. Subsequently an attempt is made to bring the soft parts over the bone by adhesive traction. This failing, re-amputation must be done, at a later date and under more favorable conditions.

FRACTURES

Fractures, usually compound and frequently associated with embedded foreign bodies, make up a substantial percentage of the injuries. These should be debrided in the usual manner, following which, if the fragments are in good alignment, a plaster cast may be applied. If this is not appropriate, traction may be used. The method advocated by Orr, of closing the fracture up in plaster, has never appealed to me, probably because of lack of experience with this method. Plaster in the form of sugar tongs, or with plaster bridges over the region of the injury, facilitate dressing the wound. Spinal anesthesia, when the lower extremity is involved and the patient is in good condition, has many features to recommend its use.

Following thorough debridement of all wounds and coating of their interior with sulfanilamide or sulfathiazole, patients should have for the first 72 hours 15 grains of sulfathiazole every four hours by mouth or, if this is not tolerated, the same dose of sodium sulfathiazole intravenously.

GAS GANGRENE

Gas gangrene is a complication that, for practical purposes, does not occur if the wound has been properly debrided. If it does occur, wide excision of the wound should be done with the liberal use of sulfanilamide locally and orally. Some x-ray specialists are enthusiastic over the results attributed to deep x-ray therapy. I know of no large series of cases proven beyond a question of doubt that have been treated solely by x-ray therapy. It would seem that the method, though hopeful, is still in the experimental stage.

BURNS

Burns were not encountered in the injured that came under my observation. They comprised a very large group in certain localities and the subject merits consideration by someone who can speak on the treatment with authority. A committee has been appointed to undertake special consideration of this problem.

SEGREGATION OF CASES

When the number of patients and the number and training of the hospital staff justifies it, segregation of the patients adds to efficiency in their care. As an example, in the Queen's Hospital the following divisions would seem advisable:

(1) Neuro-surgical injuries
(2) Chest injuries
(3) Abdominal injuries
(4) Fractures
(5) Amputations
(6) Burns

CONCLUSION

Many of the suggestions here made are not original. Some of them have been contributed by Dr. Judd from his previous war experience. All of them, I believe, will be found useful if we are again called upon to treat a considerable number of injured. In conclusion, the admonition of "Be ye also ready" applies to every Territorial inhabitant, but doubly so to those caring for the war wounded.

881 Young St.

U. S. Naval Hospital, Pearl Harbor, T. H.*

REPORT OF ACTIVITIES, DECEMBER 7, 1941

It was a quiet, peaceful Sunday morning, a few minutes before 8 o'clock when two corpsmen took their place at the foot of the flagpole on the lawn in front of the hospital. One carefully cradled Old Glory and the hospital flag in his arms while the other firmly grasped the halyards. A few medical officers reporting early loitered around the desk of the Officer of the Day. No one gave heed to the insistent droning of motors overhead —it was the usual morning experience. Sudden terrific explosions nearby shattered the Sabbath stillness. "Colors," called the Chief, and the flag struck the peak and unfurled in the gentle morning breeze. "Carry on" was ordered amidst the spattering of the machine gun bullets as officers living on the reservation dodged and hurried to the hospital. The Mate of the Day reached for the telephone, ordering all medical personnel ashore to report for duty immediately. And so began the memorable day, December 7th, 1941, for the 35 doctors, 29 nurses, and 256 corpsmen on active duty at the United States Naval Hospital, Pearl Harbor, T. H.

There was no confusion as each man and woman proceeded to his assigned post of duty, according to plans of some months' preparation. Supplies were broken out and distributed, ambulances were dispatched, and the grim business of caring for the wounded began.

Casualties arrived in a heavy stream and for some two hours they were received at the rate of several per minute. The immediate handling of such a flood of patients was quite a problem, but it was solved by distributing them to all wards as they were received. It was recognized that a receiving ward would have created a hopeless bottleneck. This distribution of patients was directed by the Commanding Officer, Captain Reynolds Hayden, and the Executive Officer, Captain Frank Ryan.

The badly wounded, those needing immediate surgical attention, were sorted out by the admitting officer and sent directly to the surgical amphitheater where four operating teams worked steadily without rest for days. The chief surgical nurse and assisting hospital corpsmen deserve special commendation for their untiring efforts. Obvious candidates for orthopedic surgery were directed to a special ward in the hospital, while less seriously wounded, with or without obvious fractures, were distributed to the nearest vacant bed in any of several wards.

One of the striking aspects of these casualties was the high percentage of first and second degree "flash" burns from nearby high explosive blasts. A large majority of these patients had been overboard and were covered with fuel oil. Casualties were so numerous that no attempt could be made to remove the oil or debride the wounds until the first or second day after admission. It was therefore necessary at first to use some type of tanning process over the oil; results however were quite good. The more severe burn casualties were segregated into specially designated wards where the maximum amount of proper supplies and personnel were concentrated.

Blast injuries of the lung as they became apparent were collected in one ward for more efficient treatment. As immediate measures, 1500 units of tetanus antitoxin were given to every patient unless it had previously been done at a battle dressing station; morphine in solution was also available and prescribed generously. Sulfanilamide powder was more than "frosted" into all open wounds and sterile dressings applied, while the patient of necessity was bedded for further disposition. Blankets, hot water bottles, oxygen, intravenous fluids and plasma were on hand in sufficient quantities to care for the more urgent cases. As might be expected, all patients were suffering from shock of varying degrees. Most deaths in the hospital occurred shortly after or within 24 hours of admission and were due to shock.

The care of patients after their first emergency treatment required 24 hours a day for about 10 days after the raid. Doctors, nurses and hospital corpsmen were divided into watches for this purpose. While the main operative suites were blacked out at night, work in the wards during this time was quite difficult, because total blackout was imperative. At night, therefore, the only light available for ward treatment was the faint blue light given by flashlights equipped with blue glass. This naturally seriously slowed up work, especially intravenous medication.

* Approved by Public Relations Officer, 14th Naval District Intelligence Office.

As the days wore on additional surgical dressings were supplied by the Honolulu Chapter of the American Red Cross and quantities of "wet" plasma were furnished by the Honolulu Blood and Plasma Bank operating under the auspices of the Honolulu Chamber of Commerce. Grateful acknowledgement of these valuable contributions has been made by the Commanding Officer.

The tremendous pressure of work in caring for the living under air raid conditions can only be experienced, not described. It has prevented preparation of a more elaborate or detailed report than the following.

BURNS

Tannic acid, jelly and spray, with and without silver nitrate or gentian violet, was used; and experience does not warrant the recent disapprobation these valuable remedies have received. Debridement was carried out to the extent of the number of hands and amount of time available. Morphine generously, heat of course, plasma and other fluids in quantity, with control by the laboratory in the most severe cases, was the order of the day.

Sulfadiazine in triethanolamine solution, so widely heralded locally, was not available and was not used in a single case. A great opportunity for comparative study was missed, but the future may offer it again.

Statistics cannot be given; aid and comfort to the enemy must be avoided; but the results of treatment under the circumstances as we found them were remarkably good. Individualized ideal treatment for a limited number of burn casualties is the goal of our endeavor; but when faced within a few hours with a greater number of burn cases than one would see in a lifetime of practice, that is a different matter. Attention should be focused on prevention, and already-learned lessons should be relearned, namely:

1) clothing, even light clothing, will protect the individual against a majority of these first and second degree "flash" burns, and

2) Escharotic agents should not be used on the face and the hands. On these areas any mild antiseptic ointment is preferable (the British use a 1% gentian violet in Merthiolate jelly at battle dressing stations).

WOUNDS

Sulfonamide therapy, both local and general, is revolutionizing the treatment of wounds. Much is being written elsewhere on the subject but experience at the Naval Hospital demonstrated that the "Golden Period" of six hours can be ignored. Cases too numerous to mention proved this point. It is enough to mention one. This man had extensive, lacerated, shell wounds of the lower third of the hamstring muscles of both thighs. These were generously filled with sulfanilamide powder and dressed. By some odd chance he was not sent to the surgical amphitheater for almost 72 hours. At this point the wound was thoroughly debrided and the severed muscles sutured. Healing was by first intention.

Summarizing, it is worthy of note that wound infection occurred in only a few cases. Treatment in the main was sulfanilamide powder in the wound, and other sulfonamides, thiamine chloride and cevitamic acid by mouth. No cases developed tetanus or gas gangrene.

ORTHOPEDIC SURGERY

All types of fractures, with and without complicating shell wounds, were treated with satisfactory results. More than half of the fractures were compound. Orr's plaster cast technique was used throughout for final dressing, and of the many cases so treated, only one had a temperature of over 99F during the hospital stay.

The officers in charge of the orthopedic ward deserve and earned the commendation given them by the surgeon [1] sent here by the Surgeon General on a tour of inspection.

GENERAL AND GENITO-URINARY SURGERY

Although patients in these classifications were comparatively few, treatment accorded them was in keeping with the best traditions of modern surgery including sulfonamide therapy.

BLAST INJURIES OF THE LUNGS

A number of cases were recognized on admission as having some respiratory injury. Others did not develop symptoms until later in the day. Accordingly 19 of these cases that survived were segregated in one ward for appropriate therapy. At first it was thought that they were suffering from the irritation of the pulmonary mucous membrane by the inhaled powder or oil smoke, with possibly some psychic trauma. Later, with more time for study of the cases, it was apparent that the condition was what is described by the British as "blast injury of the lungs." In varying degrees of severity and differing combinations, these men presented the symptoms of: shock, respiratory dif-

[1] The surgeon referred to was Dr. I. S. Ravdin of Philadelphia.—Ed.

ficulty, mainly inspiratory; cyanosis; cough; pain in the chest, more often lateral than central; and restlessness. The restlessness was marked and out of all proportion to the apparent severity of injury. The sputum was frothy and often blood-stained. Signs were either absent or consisted of hyperresonance with coarse and sibilant rales bilaterally. Secondary infection with the signs and symptoms of bronchial pneumonia developed in four cases. X-ray films of the chest in the uncomplicated cases revealed a dense mottling throughout both lung fields, resembling a patchy bronchial pneumonia. All of these men had been in the vicinity of high explosive blasts but there was no external evidence of injury. The main pathological lesion is described as pulmonary hemorrhage, massive or multiple, with rupture of the capillary and alveolar walls. There may be associated subarachnoid hemorrhages. These lesions explain the symptoms. Treatment was supportive and symptomatic, namely, strict bed rest, oxygen by tent or Boothby-Lovelace mask, which was certainly lifesaving in every serious case; heat; fluids and morphine for shock (in retrospect, plasma would have helped) and morphine and codeine for pain, cough, or restlessness. The barbituates did not seem to be of much value. 16 cases recovered completely, but 3 remained with roentgenographic evidence of failure of resolution, and 2 have definitely diminished pulmonary function. This clinical entity and picture should be recognized by all medical and other personnel at battle or first-aid stations, to permit proper disposition of these cases to the nearest hospital. The early institution of rest and other necessary measures is of prime importance.

The Staff of the Naval Hospital takes pride in the fact that this very large stream of casualties was adequately cared for without outside assistance except for a number of trained nurses from Honolulu who volunteered their services. Their assistance was very valuable and greatly appreciated.

Surgical Treatment of Cranio-Cerebal War Wounds

RALPH B. CLOWARD, M. L.

Honolulu,

Among the most serious wounds seen in war casualties are the penetrating wounds of the head. The majority of these wounds, although not immediately fatal, will result in complications which go on to a fatal termination if the wounds are not properly treated from the beginning. It is the purpose of this communication to outline the accepted neurosurgical methods of treatment of these wounds, which were used in our recent experiences with war casualties in Hawaii. These methods are the result of an accumulation of knowledge taken from the writings of Dr. Harvey Cushing and his associates [1] in the first World War, and from the numerous articles published by European neurosurgeons in France,[2, 3] Germany [4] and England [3, 6] since 1938.

The wounds usually encountered are compound depressed fractures of the skull produced by sharp, irregular fragments of metal (Fig. 1). The nature of the wound produced depends upon the size and position of the metal fragment when it makes contact with the head. Some of the scalp wounds are so small they may be missed on casual examination. Beneath these small scalp wounds, which may appear to be nothing more than a scratch, one may find by x-ray examination extensive fractures of the skull and a large thin flat metallic object in the brain. The larger wounds in the scalp are jagged, irregular defects with multiple radiating lacerations and considerable destruction to tissue.

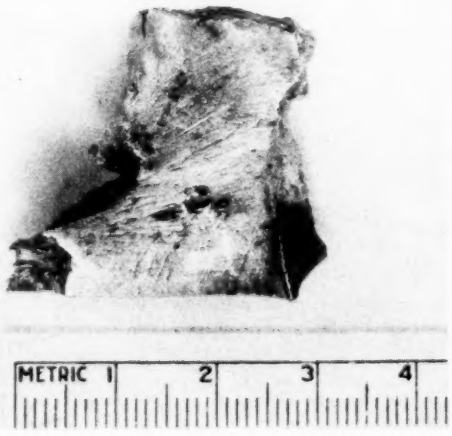


Fig. 1. An example of the type of metallic foreign bodies removed from the brain of war casualties.

Injuries to the skull by these missiles are usually circumscribed holes with no linear fracture line radiating from the point of entry. The hole in the outer table of the skull is almost always small, corresponding to the size and shape of the missile. The hole in the inner table is as a rule many times larger than the missile. Numerous shattered fragments of the inner table of the skull are carried deep into the brain by the foreign body, lacerating the dura mater, cortical vessels and brain substance over a much wider area than one would suspect from the size of the foreign body.

Success in the treatment of this type of wound depends upon: first, the preliminary treatment given the patient at the time of his injury; second, the time of the operation; and third, the nature of the operative procedure itself.

The preliminary treatment is extremely important. All hair should be clipped from the head. This is essential for careful inspection of the scalp, since the smaller wounds may not be found through a thick head of hair. The edges of the lacerated wound are cleansed with soap and water, and bleeding from the larger vessels stopped with local pressure or a piece of rubber tubing about the head. Temporary dressings are then applied after the wound has been filled with one of the sulfonamide drugs. Morphine is contraindicated unless the patient has extensive painful wounds elsewhere; it should not be used routinely.

On admission to the hospital, the patients are first examined neurologically to determine, if possible, the extent of the injury to the brain. If the patient shows signs of shock, this is treated with intravenous saline, blood plasma or whole blood. Tetanus antitoxin or a "booster" injection of tetanus toxoid is administered and x-rays of the skull are taken, stereoscopic views whenever possible. It must be emphasized in taking x-rays of the skull that sufficient voltage be used or the time of exposure prolonged in order to obtain a dark film. Small depressed fragments of bone and often the metallic foreign body itself may be entirely missed in an x-ray that is under-exposed.

Operation for this type of injury should not be delayed any longer than necessary. The optimum time for operation is within the first six hours after the injury. However, if of necessity the procedure must be delayed 24 to 36 hours it should be treated as a fresh wound and closed without drains. Wounds over 48 hours old, according to the European surgeons,[7] must be treated as infected wounds and left open.

The choice of anesthetic depends upon the patient's condition at the time of the operation. The majority of our cases were conscious and cooperative so that a local anesthetic of 2% novocaine was adequate. In the restless uncooperative cases, rectal avertin anesthesia supplemented with intravenous sodium pentothal can be used.

In the treatment of scalp wounds a wide area circumscribing the wound is painted with iodine and the area anesthetized by a circular local block anesthesia. The wounds can then be scrubbed and cleansed without pain to the patient. Large quantities of sterile water and green soap and a mild antiseptic are used. All jagged irregular edges of skin are cut away, using if possible a fusiform incision around the wound. Large skin defects up to 4 cm. in diameter can frequently be closed tightly by adequately undermining the adjacent scalp. If the edges of the wound cannot be approximated, a second superficial incision down to the periosteum can be made on either side of the wound 3 or 4 cm. from its edge. Initial wounds can then be closed, using two layers of black silk. The two raw crescent shaped areas produced by the laterally placed incisions rapidly granulate and epithelialize. Drains are never used in fresh wounds.

When the penetrating hole in the skull is small, one can obtain adequate exposure for treatment of the underlying structures by rongeuring away the jagged edges of bone and enlarging the defect. Holes in the skull produced by larger missiles, however, require more exposure to adequately treat the extensive damage to the brain and dura mater. In these cases a small bone flap is elevated along one side of the hole in the skull. The exposure of a bone flap is important also in order to obtain a large piece of periosteum from the skull to be used in the repair of the dura mater.

The irregular holes in the dura mater are always larger than the scalp wound, because of tearing by the fractured fragments of the inner table of the skull in addition to the missile. A careful debridement of the irregular edges of the dural defects is made to obtain clean edges. All defects in the dura mater must be closed tightly to prevent leakage of cerebrospinal fluid through the wound. The defect in the dura mater cannot be closed by pulling its edges together like the scalp because the dura has no elasticity. It is therefore necessary to patch the defect with tissue obtained either from the periosteum of the overlying skull or fascia lata from the thigh. The importance of this tight closure of the dura mater cannot be overemphasized, particularly when the wound passes through any of the paranasal sinuses. The development of secondary meningitis or of cerebrospinal fluid draining from the nose can thus be prevented.

The most important part of the operative procedure is a thorough debridement and cleansing of the missile tract through the brain. Along the missile tract one may find hair, dirt, grass and fragments of fractured bone. The damaged brain tissues and blood clots are removed with suction and all foreign material carefully picked out of the wound. The sinus tract is then gently irrigated with copious quantities of warm sterile saline solution. If the tract is deep a catheter may be attached to the irrigating syringe. The catheter may also be used to great advantage to palpate the depth of the wound for foreign bodies.

When an inspection of the tract in the brain shows it to be completely free of foreign material and all bleeding points have been controlled, the tract is filled with sulfanilamide powder before the wound is closed.[8] Sulfanilamide has been found to be non-irritating to the brain and to exhibit the same bacteriostatic effect there as in open wounds elsewhere.[9] The question arises as to whether the metallic foreign body should be removed from the brain or left in. Obviously if the missile is at all accessible it should be removed. The incidence of epileptic attacks in individuals with bullets in their brain is said to be as high as 50%. When the foreign body is small and has penetrated the brain to a great depth, however, it is best not to attempt to recover it.

The post-operative care of the uncomplicated case consists of absolute bed rest for a minimum of three weeks. Pain is readily controlled with aspirin. A routine course of sulfonamide therapy is given for a week or ten days, or longer, depending on the temperature reaction. All patients are placed on anticonvulsant drugs in adequate doses. Phenobarbital .065 Gm. (grains 1) three times a day is recommended. Patients are strongly ad-

vised to continue the drug for a period of at least one year following the injury.

In the cases treated within 48 hours after the bombing attack by the procedure outlined above, no post-operative complications were encountered. The following complications may arise from these injuries: persistent increased intracranial pressure from edema; secondary hemorrhage along the missile tract with hematoma formation; subarachnoid hemorrhage; and meningitis. In order that these complications may be recognized early, frequent neurological examinations including ophthalmoscopic studies must be performed. Lowering of the level of consciousness or development of a hemiplegia may indicate formation of an intracerebral hematoma and require reopening of the wound. Lumbar punctures are done only when the patient shows signs of meningitis or persistent subarachnoid hemorrhage indicated by rise in temperature, rigidity of the neck and slow pulse.

Patients that are not operated upon within the first 48 hours should be treated as infected cases.[7] The scalp, bone and dura mater are debrided as described above, the missile tract cleaned out and all foreign material removed. The entire wound is then filled with sulfanilamide powder from the bottom of the missile tract in the brain to the skin, and the tract in the brain packed loosely with vaseline gauze or gauze strips surrounded by rubber tissue drains. This type of packing is used to prevent the gauze and the sulfanilamide powder from becoming adherent to the brain tissue which may result in hemorrhages when it is removed. All head wounds are dressed with a large dressing. A large pad of cotton is bandaged over the sterile dressings to give protection to the tender scalp in the clean wounds and to absorb pus and cerebrospinal fluid in the infected ones.

The principles of treatment described above can best be exemplified by a head injury case with complications.

CASE REPORT

U. O., Japanese female, age 5 years, a war casualty, was admitted to the Children's Hospital, Honolulu, five weeks after her injury. She had been treated in a rural hospital where x-rays of her head, taken at the time of her injury, were thought to be negative for skull fracture (Fig. 2). The scalp wounds had been sutured without drains. She was given an adequate course of sulfonamide therapy, but continued to run a fever and developed a very stiff neck. The meningitis failed to respond to the sulfonamide drugs and the scalp wound broke open and drained pus. The x-rays of the skull were then repeated, this time using twice the exposure of the initial film. The darker film thus obtained revealed the skull fracture with numerous foreign bodies in the left frontal lobe of the brain (Fig. 3).

On admission to the Children's Hospital, the child was found conscious and alert. There were no positive neurological findings except a moderate blurring of the optic discs. The scalp wound of the right forehead at the hair line was oozing pus. The patient was operated upon under ether anesthesia and an abscess about 4 cm. in diameter

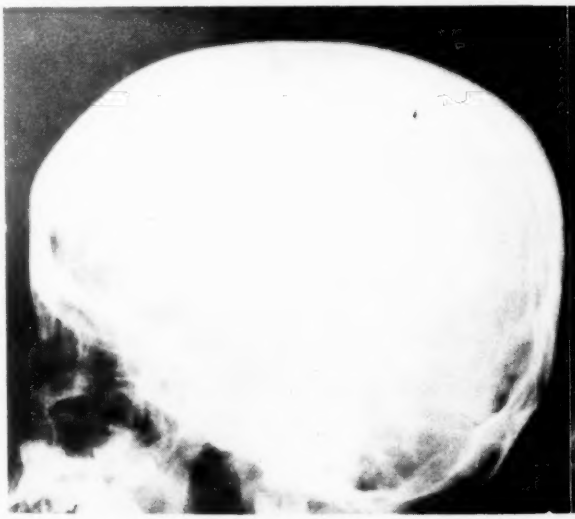


Fig. 2. Underexposed X-Ray of skull which fails to show extent of fracture.

Fig. 3. Second X-Ray of skull showing intra-cerebral foreign bodies of bone and metal.

was found in the right frontal lobe containing considerable hair, bone and metallic fragments, and pus. The abscess cavity was cleaned out, irrigated with saline solution and filled with sulfanilamide powder and packed open. Four days later the entire abscess wall with a considerable amount of edematous brain tissue of the frontal lobe had herniated through the defect in the skull, forming a large cerebral fungus on the outside of the head. This was removed and in doing so the anterior horn of the ventricle was opened and copious amounts of cerebrospinal fluid drained from the wound. The child has shown some improvement since the last operation. With the constant drainage of cerebrospinal fluid from the ventricle her stiff neck has disappeared and the temperature is gradually subsiding. She is still in the hospital and probably will be for many weeks.

COMMENT

This case illustrates the necessity of good x-ray pictures and early radical treatment of the penetrating wounds of the head to prevent the development of the serious complications described in this case.

CONCLUSIONS

The treatment of penetrating war wounds to the head as here outlined has now been used in a sufficient number of cases to prove its value. By improving the surgical technique in the first World War, Dr. Harvey Cushing was able to reduce the mortality of this type of wound from 60 per cent to 28 per cent.[1] With the addition of the sulfonamide drugs neurosurgeons of the second World War have lowered the mortality rate still farther. If we in Hawaii should again be subjected to attack, the penetrating wounds of the head, if treated in this manner need not be considered as serious or fatal wounds.

Young Hotel Bldg.

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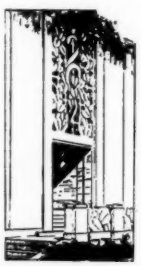


Gas Gangrene and Tetanus

Their prevention and management in war wounds.

F. J. HALFORD, M.D.

Honolulu

It is of more than passing interest that notes were made on the occurrence and management of gas gangrene and on the occurrence—or rather non-occurrence — of tetanus among the casualties of December 7th. I had the opportunity, through the courtesy of the Army physicians in charge, to observe those cases seen at the Tripler General Hospital at Fort Shafter, Honolulu.

There were only 11 *proved cases of gas bacillus infection,* though the number and type of casualties treated would have led us to expect not less than 4 or 5 times this number. It seems likely that thorough debridement of wounds and dressing without primary suture largely account for this surprisingly low incidence; perhaps the generous use of sulfanilamide, both topically and orally, also played a part.

All 11 *cases of gas gangrene occurred in cases where primary suture of the wound was performed,* and this was done in only a small proportion of the cases treated. Certainly this points very clearly to the danger of such a procedure. Traumatic wounds should not be subjected to primary suture! Sulfanilamide cannot be relied upon to prevent gas gangrene infection unless the wound is left open.

So much confusion still exists as to the proper choice of a sulfonamide for use in wounds that I pass on herewith the judgment of Dr. Perrin H. Long on this subject. "Plain *sulfanilamide* crystals, the larger size, are best for direct application. In the abdomen 4 to 8 grams of sulfanilamide is more than adequate; it may be supplemented by the same drug orally in a dose of 4 Gm. stat and 2 Gm. every 4 hrs. for 24 hrs., then 1 Gm. every 4 hrs. thereafter, with a check of the white count on the 3rd day, or intravenously in a dose of 500 cc. of an 0.8% solution twice a day." In streptococcic or pneumococcic infections, *sulfadiazine* is to be preferred, 4.0 Gm. stat followed by 1 Gm. every 4 hrs. for 3 days; or sodium sulfadiazine, 0.1 Gm. per kilogram body weight in 5% solution in distilled water, daily by vein. *Sulfathiazole* should not be used for topical application to wounds because it is poorly absorbed and forms a plaster-cast type of covering. Its use should be practically confined to gonococcus infections, for which it is specific; sulfadiazine has superseded it for almost every other organism.

The diagnosis of gas gangrene was made on the basis of the following criteria:

(1) The typical "dead rat" or garlic-like odor (in all cases).

(2) Increased temperature, pulse and rate of respirations; usually a rapid, pounding pulse out of proportion to the fever.

(3) Crepitation beneath the skin adjacent to the wound (a late sign: don't wait for it).

(4) X-ray evidence of gas in the tissues (also late).

(5) Smears, and 2 generous biopsies, from the involved area, for laboratory examination.

Suspected cases were isolated in a "G-G" ward provided with a separate operating room, dressing sets and sterile supplies.

These cases were dressed twice daily, at which time generous amounts of sulfanilamide were dusted and even brushed into the wounds. The drug was also used orally, in combination with sulfathiazole. Transfusions of 500 cc. of whole blood were given almost daily, and were thought to be of definite benefit. X-ray therapy, though its status is still controversial, was employed in every case; the factors used were 140 Kvp. with a filter of ½ mm. copper and 1 mm. aluminum, and a 15 x 15 cm. port. Each case received 200r on diagnosis, followed by 100r twice a day to a total dose of 700r. Not one case received a therapeutic injection of gas gangrene antitoxin, largely because we have doubted the specificity of commercial antisera for our local gas-forming anaerobes. Studies are now under way at last to determine whether our gas-formers are *malihinis* or *kamaainas.**

* ***malihini***—Hawaiian for newcomer, recent arrival.

kamaaina—Hawaiian for long-time resident, "child of the land."

Almost every casualty treated at Tripler Hospital had previously received prophylactic injections of tetanus toxoid, and was given a "booster" injection on or soon after the 7th, which may help account for the fact that *no cases of tetanus were observed* among them. Debridement, non-suture, and just good luck may, of course, also have played a part. Tetanus antitoxin was used in only a few cases which were not definitely known to have had the toxoid. The details as to the type of toxoid employed, the interval between injections, the interval between the second injection and December 7th, and the number of cases treated, are not available as yet; they will no doubt be made public by the Medical Department of the United States Army in due course. It does not seem unduly enthusiastic, however, to crusade on the basis of this experience for mass tetanus toxoid inoculation of all civilians, adults as well as children,—particularly in view of our deplorably high annual incidence (5.7 per hundred thousand) of tetanus in Hawaii even in peace time.

1133 Punchbowl St.

TETANUS IN HAWAII

Morbidity & Mortality Statistics
Hawaii Territorial Board of Health

YEAR	OUTSIDE ISLANDS (not Oahu)		ISLAND OF OAHU (not Honolulu)		HONOLULU only		TOTAL FOR TERRITORY		
	Cases	*Deaths*	*Cases*	*Deaths*	*Cases*	*Deaths*	*Cases*	*Deaths*	*Mortality*
1934-35	6	6	5	2	19	7	30	15	50%
1935-36	9	8	2	1	16	7	27	16	59%
1936-37	7	6	4	2	12	8	23	16	69%
1937-38	6	2	4	1	11	6	21	9	43%
1938-39	5	4	2	1	15	6	22	11	50%
1939-40	6	4	2	1	17	6	25	11	44%
1940-41	9	2	1	0	13	8	23	10	43%
Annual average	6.8	4.8	2.8	1.1	14.5	6.8	**24.4**	**12.5**	**51.2%**

Mortality by Age Groups

AGE IN YEARS	NUMBER DEATHS	% TOTAL DEATHS
Under 1	3	3.4
1 to 9	34	38.6
10 to 19	16	18.1
20 and over	35	39.7
Total (7 years)	88	100.0

Every month, for the last 7 years, two people in the Territory of Hawaii have developed tetanus, and one of them has died of it!

Eye Injuries in Warfare

W. J. Holmes, M. D.

Honolulu

The outcome of ocular injuries depends upon the promptness and adequacy of first aid treatment. This is especially applicable to war injuries, where infections are more frequent and virulent than in injuries incurred in industrial accidents. It has been estimated that ocular injuries and disturbances of the visual apparatus comprised 8 per cent. of all war injuries in World War I.

In order to save eyes, combat infection, and retain useful vision, it is imperative that a well devised plan, founded on sound ophthalmological principles, be carried out within the shortest possible time. The following paragraphs are offered as a brief review to civilian practitioners and medical officers who are not accustomed to handle eye diseases but who in an emergency may be called upon to do so. The principles emphasized reflect current conceptions on the diagnosis and management of eye injuries and have been successfully employed during and since the raid on Oahu.

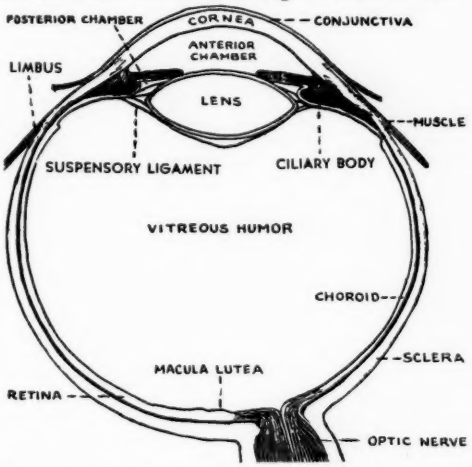
Orbital Fractures

Fractures of the orbits may be depressed fractures of the floor or fractures of the anterior fossa involving the roof. Either of these may involve the apex of the orbit and endanger vision. Ecchymoses and subconjunctival hemorrhages appearing hours or days after the injury are pathognomonic of orbital fractures. Emphysema of the soft tissues indicates a fracture into one of the nasal accessory sinuses. Immediate forward protrusion of the eye is evidence of hemorrhage into the muscle cone; pulsating exophthalmos developing later suggests traumatic arterio-venous aneurism; paralyses of the extraocular muscles, immediate or delayed loss of vision are signs of injury at the orbital apex.

The treatment of fractures of the orbital floor consists of prompt reduction of the fragments by elevation of the malar bone through the antrum or through an incision made in the lower lid.

Infection

Infection within the orbit manifests itself in the form of orbital cellulitis. It is characterized by unilateral swelling of the eyelids, edema of the conjunctivae, proptosis, partial fixation, and pain on attempted rotation of eyeball. The constitutional symptoms are mild in the early stages but, with the development of an orbital abscess, become those of a severe infection. The treatment consists of hot applications over the eye, chemotherapy, and if necessary, a free exploratory incision into the orbit through the lower lid.



Horizontal section of eye, showing upper surface of lower segment.

Burns

Burns of the eye may be due to thermal, caustic, or gaseous agents. They all produce more or less pain, lacrimation, swelling and redness of the lids, edema of the conjunctivae, and in extreme cases, edema and erosion of the corneal epithelium.

In burns due to ultra violet light from electric welding, the symptoms appear after a latent period of eight to fourteen hours and disappear within twenty four to thirty six hours. The treatment is restricted to the frequent applications of 2 per cent. Holocaine ointment, the use of opaque glasses, and cold compresses.

The treatment of burns due to mustard gas (dichlordiethyl sulphide) and tear gas (Chloracetophenone and brombenzi-cyanide) consists of frequent irrigations with 1 per cent. sodium bicarbonate solution followed by instillation of sterile petrolatum. Atropine in strengths of 1 to 2 per cent. should be used for corneal complica-

tions. Cocaine must not be used in mustard gas burns. These eyes must never be bandaged but should be protected with dark glasses.

Burns caused by caustic acids or alkalies should be immediately irrigated with generous quantities of water. Thorough mechanical removal of all adherent particles is of extreme importance. A firm, protective coagulum over the conjunctivae is desirable and can be obtained by using a 20 per cent. solution of glycerite of tannic acid, U.S.P. The after treatment depends upon the degree of injury. Atropine should be prescribed if corneal complications develop.

External Wounds

Wounds of the lids and conjunctivae often complicate lesions of the globe and face. The lids rapidly become edematous, the swelling often closing the eye within a few moments. The treatment consists of washing the skin carefully with soap and water and repairing the torn edges at once with primary sutures. This routine is contrary to the teachings of Dr. Moorhead but is advocated for these wounds because new-formed granulation tissue may produce disfiguring contractures of the eyelids, adhesions between the lids and the bulb, and cicatricial deformities necessitating secondary plastic repair. Where dirt has been carried into the wound, anti-tetanus serum should be given, unless the patient has previously received tetanus toxoid.

Foreign Bodies

Small foreign bodies in the orbit which are not easily accessible and are not associated with infection should be left alone.

Non-perforating foreign bodies of the conjunctivae and corneae are the commonest of all eye injuries. Good anaesthesia (0.5% pontocaine, 4% cocaine) and proper illumination are essential in removing the invading particles. Metallic foreign bodies often leave a surrounding rust area which must be thoroughly removed. After removal of all except very superficial substances, an antiseptic, such as bichloride of mercury 1:3000, should be applied and the eye bandaged for twenty-four hours. Ulcers and abrasions of the cornea frequently heal without any residuum; however they must be considered potentially dangerous, because of the possibility of infection and perforation. In order to detect their presence, one drop of a 2 per cent. solution of fluorescein is instilled into the conjunctival sac; this colors the denuded area a brilliant yellow-green. If the abrasion is infected, it should be curetted and cauterized with tincture of iodine or with 10 to 20 per cent. trichloracetic acid. Rest of the eye is insured by the local administration of homatropine hydrobromide (2 per cent.) or atropine sulphate (1 per cent.) and bandaging.

Anaesthetic ointments are not recommended for painful corneal lesions, due to their tendency to dry the superficial layers of the cornea. If pain is severe, hot moist compresses and oral or subcutaneous analgesics should be prescribed.

Injuries of the Globe

Perforating ocular injuries resulting from explosions of projectiles differ from penetrating injuries of civilian life by their multiplicity, the occurrence of extensive associated lacerations, and the prevalence of infection. Roentgenograms should be taken in every instance of suspected intraocular foreign body and, if possible, accurate localization should be secured. When the eyeball presents an open wound, application of the magnet to this wound may be sufficient to deliver the foreign body. Non-magnetic foreign bodies lodged anterior to the vitreous should be removed through an incision into the anterior chamber. If they are embedded in the iris, the portion of the iris containing the foreign body should be excised. If they have penetrated the lens, simultaneous delivery of the cataract and the foreign substance is the procedure of choice. Foreign bodies which have entered the vitreous should be extracted immediately through a posterior, scleral incision. When the foreign body is not easily accessible and the eye still has useful vision, there is no indication for operative intervention. The mere presence of an intraocular foreign body does not spell the loss of an eye or great diminution of its vision. Many cases are on record where foreign bodies have been tolerated within the globe from twenty to forty years without inciting an inflammatory response. If the vision is lost and the foreign body is in the vitreous or in the ciliary region, the eye should be enucleated even if it is devoid of pain or irritation.

Perforating wounds of the corneae and sclerae with prolapse of uveal tissue or vitreous should be treated by excision of the prolapse and by covering the wound with a conjunctival flap. If the wound edges are frayed and infiltrated, they should be trimmed and cauterized with 50 per cent. trichloracetic acid. The injured eye should be put at rest by full dilatation of the pupil with 1 per cent. atropine sulphate and both eyes should be bandaged for a period of five to seven days.

FIG. 2

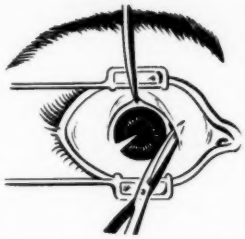


FIG. 3

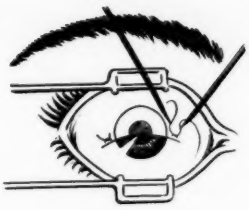


Fig. 2. The eye is anaesthesized by instillation of 4% cocain and subconjunctival injection of 1% Novocain. The conjunctiva is grasped with forceps at 12:00 o'clock, and severed with scissors between 11:00 and 1:00 o'clock, close to the limbus. It is undermined with blunt and sharp dissection until it can be freely moved down past the midline of the cornea.

Fig. 3. Sutures are placed on the medial and lateral lips of the flap and tied to the underlying conjunctiva at 4:00 o'clock and 8:00 o'clock respectively. 1% atropine is instilled and both eyes are bandaged. The sutures are removed on the eighth day.

Local treatment in every case of perforating ocular wound should be augmented by intravenous or intramuscular foreign protein therapy. For this purpose, 10 cc. of boiled milk may be injected into the gluteal muscles or 25 to 75 million typhoid bacilli may be given intravenously.

SYMPATHETIC OPHTHALMIA

Sympathetic ophthalmia is an inflammation leading to atrophy and blindness which occasionally develops in a previously normal eye after its fellow has received a perforating wound. The likelihood of its occurrence is greatest when the site of the perforation is one-quarter inch from the boundary line of the cornea, resulting in exposure and damage to the ciliary body. The disease occurs in the uninjured eye only when the first eye shows signs of irritation due to delayed, improper healing or marked interference with its function.

If, after a perforating wound, the injured eye becomes soft and atrophic, the scar on its surface retracted, the globe sensitive to touch, and the vision failing, it has the potentiality of producing sympathetic ophthalmia. In the uninjured eye, the warning symptoms are photophobia, transient blurring of vision, tearing, and tenderness of the eyeball. The physical signs in either eye are those of a full blown iridocyclitis, *viz.*: violent pericorneal injection; small irregular pupil; muddy, discolored iris; floating opacities in the aqueous and vitreous; and at times, rise in the intraocular pressure. As a rule, sympathetic inflammation supervenes within a few weeks after an injury but there are cases on record where it has occurred many months or even years later. Prompt enucleation of a seriously injured and hopelessly blind eye is the safest measure in the prevention of sympathetic ophthalmia. The routine employment of foreign protein therapy in ocular wounds is another adjunct in reducing the incidence of this dreaded malady. After the disease is already established, large doses of salicylates (150 to 200 grains daily for an adult) are of some value.

BLAST INJURIES

Indirect traumatism caused by explosion of nearby shells and mines, or by violence applied to the tissues adjacent to the orbits may result in concussion or contusion injuries. The force reaching the eye is not sufficient to rupture the cornea or sclera but it is severe enough to produce derangements within the bulb. Disturbances of accommodation, intraocular hemorrhages, cataracts, dislocations of the lens, choroidal and retinal tears and detachments may occur. Such eyes should be placed at rest by dilatation of the pupil, binocular bandage, and strict confinement of the patient to his bed for at least one week.

GLAUCOMA

Acute congestive glaucoma is an ofttime emergency met with in times of war. States of excitement, despondency, and fatigue act as precipitating factors in the development and maintenance of high intraocular pressure. An attack usually starts suddenly in the early hours of the morning, ushered in by excruciating pain in the eye and rapid loss of vision. The globe is stony hard, extremely tender to touch, and intensely red and congested. The cornea is dull, steamy and insensitive. The pupil is dilated, the anterior chamber shallow and clouded. The immediate treatment consists of free use of morphine, the instillation of miotics (pilocarpine hydrochloride 2 per cent. and eserine sulphate 2 per cent.) and the intravenous administration of hypertonic solutions of saline or sucrose. Patients who do not respond to this regime within twelve to eighteen hours will have to submit to one of the standard operations for the reduction of increased intraocular tension.

This review is submitted with the hope that it will call attention to the frequency and gravity of ocular lesions during warfare; that it will stress the importance of retention of all possible tissue in the treatment of wounds of the ocular structures, and that it will thus contribute toward the prevention and amelioration of lasting disabilities.

45 Young Building.

Eclampsia Precipitated by a Violent Emotional Shock

Report of a Case, with Radical Treatment

G. C. Milnor, M.D.

Honolulu

Mrs. S., aged 37, nullipara, was 7 months pregnant at the time of the onset of her illness. There had been considerable nausea and vomiting during the first two months of her pregnancy. From the second month to the sixth, she seemed to be getting along very well. Urine and blood pressure were examined every three weeks, and both were normal each time. Her past medical history was not relevant.

At the sixth month, edema of the feet and legs began to appear, but the blood pressure and urine, now being checked each week, showed no evidence of toxemia. A salt-free diet, restricted fluid intake, and ammonium chloride were ordered. After ten days of this therapy the edema lessened, and the blood pressure and urine remained normal up to December 1, when she was last seen at the office.

On the memorable morning of December 7, 1941, she witnessed from close range at Hickam Field the attack on this base and on Pearl Harbor. A few hours after the onslaught she was evacuated from her home at Hickam Field and spent the day in great fear. At midnight on December 7 she began to suffer from a severe headache and nausea, and her vision became impaired. At 3:00 a.m. December 8, she became semi-comatose. When seen at this time her blood pressure was 218/124. Her face was so badly swollen one could not recognize her features. The extremities were also tight with edema.

She was taken to the hospital at once, where a urine examination showed 4 plus albumin and many granular and blood casts. The coma deepened and convulsions began. A pelvic examination showed the fetus to be high, head presenting, and the cervix tightly closed. The fetal heart sounds were good.

100 cc. of 50% glucose was given intravenously every three hours during the day. This, along with nembutal per rectum and magnesium sulphate intramuscularly, failed to improve matters. The blood pressure continued to rise, coma became deeper, and the convulsions became more severe and frequent.

We proceeded to empty the uterus by Cesarean section under local anesthesia; a 3 pound, 1 ounce male infant was thus delivered, alive and active, who continued to live and gain. The mother began to come out of the stupor six hours after operation. In twelve hours her vision began to return. She received two 100 cc. injections of 50% glucose solution after operation. This was the only postoperative therapeutic measure. The systolic blood pressure dropped from 230 to 180 in the first twelve hours postoperatively, and to 140 in forty-eight hours. The urine continued to show heavy albumin for six days, then it too showed less and less each day.

Primary union was secured in the abdominal incision, and the patient was up walking by the twelfth postoperative day, feeling quite herself. The blood pressure at the end of a month was 139/90. The urine showed a trace of albumin with no casts. The baby also was in fine condition and at one month weighed 4 pounds, 7 ounces.

Comment

I feel that fulminating, severe eclampsia of this type is best treated by early removal of the products of conception by whatever method will shock the patient least. Cesarean section seems to be the method of choice in primiparas with a closed cervix. General anesthesia is to be avoided. Opium derivatives are also to be avoided because of their harmful effects on both mother and child.

881 Young St.

Health Department Services in War Emergency

For the past year, primarily as a result of the national defense program, there has been a rapid increase in our population, requiring additional public health services, especially in environmental sanitation, communicable disease control, food inspection, restaurant sanitation, public health nursing, supervision of water supplies, and problems relating to housing. A situation taxing the Territorial Health Department beyond the point of efficiency existed even before the President declared a state of unlimited national emergency.

With the increasing imminence of war, because of Hawaii's distance from the mainland, the possible disruption of its shipping and its strategic importance to the Army and Navy, the health department recognized the need for not only expanding its regular functions but also preparing for any type of emergency. Plans were made for improving and gearing up all public health service to meet the impending war emergency. Bureau chiefs were instructed to order and keep on hand sufficient supplies for a period of at least six months. Biologic supplies, drugs necessary for emergency use, laboratory supplies and equipment were recognized as especially important items. Measures for the protection of water supply and sewage disposal systems, especially on Oahu, were carefully considered. Plans were evolved to provide a satisfactory sanitary inspection service under emergency situations. A first aid instruction course was organized for the public health nursing force. It was anticipated that the nurses would be called upon for additional services during an emergency, including first aid, bedside nursing, and obstetrical and delivery service.

When the Honolulu Disaster Council was organized, the Territorial Commissioner of Public Health was named chairman of a health and sanitation committee, composed of representatives of various related health, medical and welfare agencies. This committee pointed out in two preliminary reports that its functions would be practically the same as those normally carried on by the Board of Health, except for expansion of specific activities to meet emergencies.

It was recognized that in the event of war the problem would not be so much a matter of revising the type of service offered by the health department, but of extending its normal program and correlating its services with those of the civil, military and other agencies concerned with the promotion and conservation of health.

Seven months after President Roosevelt's declaration, Pearl Harbor was attacked. Martial law was established and the military governor asked that all departments of the Territorial government continue their special functions.

Within an hour after the first bombs fell, the executive heads of the health department were in conference. The staff on Oahu were placed immediately on 24-hour call. Day and night service was established at the office of the Board of Health and maintained for the following two weeks. An inventory of the biologics on hand at the health department and at the pharmaceutical supply houses in the city was made.

A close liaison was established with the medical departments of the Army and Navy, the medical director of the first aid stations, the medical officer in charge of the Emergency Hospital, and municipal authorities, particularly those in charge of the water supplies, sewerage system, and garbage collection. All were urged to utilize health department facilities.

Instructions were sent immediately to all physicians requesting the reporting of communicable diseases by telephone, and all cases of illness suspected of being caused by contamination of food, milk or water. Subsequently an order from the office of the military governor went out directing physicians to comply with this request. A number of cases of acute gastro-enteritis were reported. Epidemiological investigations and laboratory analyses were made. Most of the cases were traced to consumption of food kept too long under improper refrigeration. No unusual incidence of communicable diseases occurred.

After the attack, essential biologics were distributed to hospitals and first aid unit physicians requesting them. Prophylactic tetanus antitoxin was in particular demand. Physicians were cautioned to limit their requests to those biologics immediately needed.

An immunization station for vaccination against typhoid fever and smallpox was opened in the Board of Health Building; and restaurant and general sanitary inspection services were intensified. Food supplies were carefully checked.

Dairy inspection service was augmented and every assistance given to insure a continued supply of clean and wholesome milk and dairy products.

During the first few days rumors were current that the water supply had been contaminated or poisoned. These were investigated and found to be untrue. Water samples were immediately collected at various points throughout the city. Bacteriological, chemical and physical analyses were made. A portable chlorinator and a supply of chlorine gas were available, but thus far have not been required. Fortunately, no damage to the Honolulu water or sewerage systems was sustained.

In view of the close proximity of many residential districts to military objectives, it was necessary to evacuate large numbers of civilians and military dependents to schools, churches, and other community buildings removed from the points of attack. One of the important services rendered by the nursing department was the health supervision at these evacuation centers. A number of nurses reported to first aid stations and hospitals for emergency nursing services; others, particularly in rural districts, assisted in the setting up of first aid stations and in the obtaining of necessary supplies for their operation.

Public health nurses were placed on call for bedside nursing where needed. Private physicians were notified that this service was available when private nurses were unobtainable.

In anticipation of possible transportation difficulties and the need of hospital beds for other purposes, the Bureau of Maternal and Child Health developed a plan to assist in home deliveries. Delivery packs were prepared and made available, and obstetrical services were rendered by the public health nursing force in a few instances.

With telephone and other communications suspended shortly after the engagement began, it was impossible to obtain information from or issue instructions to the outlying islands. It is noteworthy, however, that the health department's representatives on the outer islands, cooperating with Army and other officials, immediately took steps to protect the water and food supplies, strengthen the control of certain communicable diseases and to utilize other public health services to the best advantage to meet local conditions. Extra supplies of biologics and drugs were distributed to the several islands as soon as transportation became available.

The Territory of Hawaii will continue to play an extremely important part in the prosecution of the present war. What new health hazards may arise cannot be foreseen. Although many health problems will be aggravated because of the war, others may become less acute. Certain general principles of public health and valuable experience already gained will guide health officials in this emergency.

M. F. HARALSON, M.D.
Territorial Commissioner of Public Health
Board of Health

OBSTETRICS DURING MAJOR DISASTER

The stork pays no heed to international affairs, and does not discriminate between war and peace. War or no war, women keep right on having babies; indeed, experience in London has shown that the stress of war conditions may even lead to premature labor or abortion. It follows that any community making plans for "medical defense" must include in them plans for maintaining, or even increasing its obstetrical facilities.

On December 7, 1941, we had a ringside seat at a war. We had anticipated such an event, and had foresight enough to plan for it in advance. We have had a chance to see our plans in operation, and now we have been able to look back and see whether they were adequate and where they might have been improved upon.

THE PLAN

The following is an outline of the steps we took in preparation for the maintenance and expansion of obstetrical facilities in the event of war.

(1) Obstetricians were assigned to maternity hospital posts instead of being used in other hospitals to care for casualties.

(2) Pediatrician-public health nurse teams, equipped with incubator, oxygen and other equipment, were available for prematures born before the mother could reach a hospital.

(3) A careful survey of all available maternity bed facilities in the community had shown that these were already overtaxed by the rapidly increasing population. It was obvious that the post-partum stay in the hospital would have to be cut down in order to decrease the obstetrical load. Our patients were therefore warned that in case of war we would continue to offer them the facilities of our delivery rooms but would expect them to return to their families earlier than under normal conditions.

(4) Arrangements were made with the hospitals to prevent the encroachment on the maternity department by casualties.

(5) All public health nurses on Oahu were given a refresher course in practical obstetrics to improve their efficiency in home deliveries.

(6) Home delivery packs were made up and kept in readiness in a convenient place for district nurses or doctors.

(7) Nursing personnel in obstetric departments were ordered kept intact regardless of the extra load the rest of the hospital might suddenly be compelled to carry.

(8) All maternity cases were repeatedly advised to continue planning for hospital deliveries, regardless of crisis.

(9) Competent pediatricians and obstetricians were to be kept available for consultation purposes as an aid to the general practitioner, or to cover for him in case he were suddenly pressed into other war-time activities.

(10) Prompt resumption of all obstetric and pediatric clinics was planned as soon as circumstances would permit.

How the Plan Worked

The obstetric load was carried through this crisis with surprising ease and with a minimum of friction. The delivery services and nursing facilities proved to be adequate. The surprising thing, however, was that we did not get the flood of premature labors or abortion cases which were expected; there was a slight flurry the first day or two, but the incidence was hardly above normal. Whether this was due to the fact that the attack was a completely unexpected one, not preceded by any period of fearful anticipation, or to an unusual degree of courage and self-control on our patients' part, or to some other factors, seems impossible to say. We are not at all sure, however, that a second attack would treat us so kindly, and our plans for caring for an increased obstetrical load are being maintained.

What We Had Not Planned

No plans can ever anticipate every eventuality; as we looked back over our experiences here we noted that several circumstances, demanding solution, had presented themselves. Here we mention a few:

(1) Immediate and continued blackouts made night traveling very difficult, slow and hazardous. Pregnant women developing symptoms of beginning labor have therefore been advised to contact their physicians before nightfall and to enter the hospital during daylight hours if possible.

(2) The curfew prevented anyone except a few specially privileged classes from being on the streets at night. In the event of onset of labor at night, however, there has been no difficulty in securing special permission for the transportation of pregnant women to hospitals.

(3) A high percentage of our midwives (30 out of 36 in Honolulu) are aliens, therefore, could not secure special permission to be on the streets at night. They were quickly convinced that any of their cases going into labor at night would have to be referred to the nearest hospital as the only solution of that problem.

(4) There was an abrupt increase in incidence of eclamptogenic toxemia. This is understandable when one realizes that a prolonged period of stress would tend to disrupt metabolism and throw a considerable extra load on the nervous system.

(5) Women in early pregnancy whose husbands were killed in the air raid might have been—and were— expected to constitute a serious psychiatric problem. It is gratifying to be able to report that this did not prove to be the case; every such individual responded well to the situation and became reconciled to carrying through with the pregnancy.

Summary

The experiences of managing a community-wide obstetrical program in Hawaii before, during and following a sudden major catastrophe are here delineated and tend to prove the importance of an adequate obstetrical program in the event of a sudden disaster. Previously made plans proved very workable in a recent acute crisis although several unanticipated problems arose which were solved without difficulty.

O. LEE SCHATTENBURG, M.D.

Mental Hygiene in Wartime Hawaii *

The concerns, reactions, attitudes, problems, thoughts, fears, suspicions and prejudices of an individual are all very important aspects of his functioning, whether this be called his morale or his mental hygiene. The sum total and interplay of all the individual manifestations of mental hygiene in a group result in the mental hygiene of a community.

The events of December 7th and the sweeping changes in every aspect of life in Hawaii since that time have naturally elicited complex and varied reactions in all of us. Before Pearl Harbor most of us proceeded on the basis that if we played the game in conventional ways we could feel secure in our existence, our belongings, our privileges and our way of life. Events have occurred which have lessened the certainty of these convictions. Fear, anxiety, uneasiness and concern of varying degrees have been the normal response in most Hawaii residents. Those who have not shown this reaction are persons whose emotional responses do not adequately reflect external stimuli.

As every physician knows, each person has his individual pattern of response to emotional disturbances. There are some in whom the visceral functions readily become disturbed; these persons now have such symptoms as tachycardia, increased blood pressure, palpitation, anorexia, nausea, heartburn, constipation, diarrhea, urinary frequency, headache and dizziness. Others have had difficulty in sleeping, in concentrating, in making decisions, in keeping their tempers and in intelligently evaluating rumors. Many pre-existing hypertensions have increased from 20 to 30 points. Well controlled cases of psoriasis, eczema, lichen planus and urticaria have experienced otherwise unexplained exacerbation. Numerous well controlled chronic sinus infections have become worse and some individuals with quiescent peptic ulcer have experienced a recrudescence.

Many other individual factors have entered into these reactions, including occupational problems, blackout restrictions, food limitations, liquor prohibition, gasoline rationing, paucity of recreational and social opportunities, irregular mail schedules, censoring of letters and news and the practicing of such wartime measures as carrying gas masks, preparing air-raid shelters, responding to air-raid alarms and receiving "tin hats."

Some hypomanics and psychopaths have not experienced any of these reactions and are now adjusting better than most of us. Other unstable individuals are less able to deal with these reactions and many of them are being treated by physicians for visceral complaints, sleeplessness, anxiety or full-blown psychoneuroses. Psychotic individuals who could be kept in the community in normal times have in some instances been committed. The number of major psychoses treated in the Clinic of the Bureau of Mental Hygiene, at the Queen's Hospital, in the month following the onset of the war was slightly less than the number treated in the previous month. In general, however, the intensity of the reactions seen in the Clinic has been more than the average of those previously seen.

The physician can best serve by recognizing the nature of insecurity reactions and by treating each case individually. Treatment will include efforts to remove as much tension as possible by discussing the patient's situation in detail, by helping him secure social and recreational interests and satisfactions, by reassuring him and by the application of other valid psychiatric procedures. Some cases will be sufficiently complex to justify referral. In general the mental hygiene of the community at the present time will be best preserved (1) by keeping everyone effectively busy but allowing reasonable time for rest and recreation, (2) by encouraging social, recreational and hobby activities, (3) by discouraging rumor, racial prejudice and unnecessary restrictions, and (4) by providing competent leadership in all types of activity.

* From the Bureau of Mental Hygiene, Board of Health
Doctor Edwin E. McNiel, Director
Doctor William M. Shanahan, Assistant Director

What to Do About Poison Gas

(This article was prepared by the Emergency Medical and Ambulance Service, Office of Civilian Defense, for the purpose of educating the public in the matter of defense against poison gas. It is approved by Colonel George W. Unmacht, Chemical Warfare Service, United States Army, Territorial Coordinator for Gas Defense, and printed here by special permission.)

For some reason almost all people are more afraid of an attack by gas than they are of an attack by explosive bombs. As a matter of fact, the danger from an attack by gas is probably less than that from explosive bombs *provided the people who are being attacked know what to do and are equipped to do it.*

There are many different gases used in warfare. It is not possible for the average person to learn enough about them to be able to tell what gas is being used. Some are harmless smoke, some merely make one cry, some make the eyes, mouth and throat sting, etc.; and some are really poisonous. It is best to pay no attention to what *kind* of gas is being used but *if there is gas in your vicinity, behave as though you knew that it was poisonous gas.*

General Precautions

The gas mask issued to the people of Hawaii will protect them against the danger of breathing any poisonous war gas. (It will not protect against sewer gas or illuminating gas.) If by the action of the enemy, bombs or shells or sprays of liquid which result in *fumes or smells of any kind* are noticed in your neighborhood, *immediately* put your mask on as you have been instructed to do. If you are in a situation where you can easily move towards the direction from which the wind is coming, or uphill, that is an additional safeguard. Almost all war gases are heavy and tend to stay close to the ground. It is better to be up high in a house, on a building, on a hill or a fence than it is to be on the ground.

Gases That Poison the Lungs

Everyone should understand that there are two principal kinds of poison gas used in warfare. One kind is very light; it blows away quickly. It may be seen for a short time but quickly disappears from sight and smell, and if there is any wind blowing, in a very few minutes it will be gone. Since it is only harmful if breathed into the lungs, your gas mask will completely protect you against it if you put it on immediately, before you have breathed any of the gas, and keep it on till the gas is gone. When you have had proper teaching in the use of a gas mask, you will have been told how to test as to whether or not the gas is gone. This is done by cautiously sniffing out of the side of the mask, to see whether the smell is still there. This kind of gas will never be dangerous for a long time if there is any wind blowing; neither will it burn the skin.

Gases That Poison the Lungs and Burn the Skin

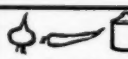
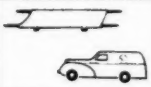
The other kind of gas is one which is like a liquid when it comes out of the bomb or shell or when it is dropped from a plane in liquid form. (Remember that *gas bombs or shells make very little noise* when they explode, compared to an explosive bomb.) These liquid gases are likely to be visible as a fog or mist along the ground. They are also likely to make the grass or leaves of trees or bushes look wet. One of them—"mustard gas"— may smell like onions or garlic; the other—"Lewisite"— may smell like flowers or very ripe fruit. *These are the most dangerous gases,* and walking over ground or around leaves or grass where these have been sprayed in liquid form is extremely dangerous *even if you are wearing a gas mask.*

Care of Liquid Gas Burns

If you are close to a bomb or a shell that has exploded and liquid is spattered on you, or if you touch a bush wet with liquid gas, or walk on ground wet with it, you need to get your clothing off and get the liquid off your skin instantly. Do not go into the house until you have removed clothing that has been spattered with the gas—if you do you are likely to injure the people in the house and injure yourself if you take the gas mask off inside the house. *You must wear a gas mask* all the time until your clothing is off and you have gotten entirely away from the place where the liquid has been spattered. If the eyes are affected they should be rinsed out with peroxide or weak baking soda solution. If the liquid actually strikes your skin you should first of all try to blot it off with a dry cloth, hand-

REFERENCE AND TRAINING CHART

CHEMICAL WARFA

CLASS	NAMES AND SYMBOLS	FORM	ODOR	PHYSIOLOGICAL EFFECT	TACTICAL CLASS	PROTECTION
VESICANTS	**MUSTARD** $S(CH_2CH_2)_2Cl_2$ DI-CHLORETHYL SULFIDE	LIQUID AND VAPOR	 Garlic, Horseradish, Mustard	Delayed effect. Burns skin or membrane. Inflammation respiratory tract leading to pneumonia. Eye irritation, conjunctivitis.		
	LEWISITE $CHCICH\text{-}AsCl_2$ CHLORVINYL-DICHLORARSINE	LIQUID AND VAPOR	 Geraniums	Burning or irritation of eyes, nasal passages, respiratory tract, skin. Arsenical poison.		
	ETHYLDICHLORARSINE $C_2H_5\text{-}AsCl_2$	LIQUID AND VAPOR OR GAS	 Stinging, like pepper in nose	Causes blisters, sores, paralysis of hands, vomiting. Severe on long exposure.		
LUNG IRRITANTS	**CHLORINE** Cl_2	GAS	 Highly Pungent	Lung irritant.		
	CHLORPICRIN CCl_3NO_2 NITROCHLOROFORM	GAS	 Flypaper, anise	Causes severe coughing, crying, vomiting.		
	DIPHOSGENE $ClCOOC\text{-}Cl_3$ TRICHLORMETHYL CHLOROFORMATE	GAS	 Ensilage, Acrid	Causes coughing, breathing hurts, eyes water, toxic.		
	PHOSGENE $COCl_2$ CARBONYL CHLORIDE	GAS	 Musty hay, Green corn	Irritation of lungs, occasional vomiting, tears in eyes, doped feeling. Occasionally symptoms delayed. Later, collapse, heart failure.		
LACRIMATORS	**CLORACETOPHENONE** $C_6H_5CO\text{-}CH_2Cl$	GAS	 Apple Blossoms	Makes eyes smart. Shut tightly. Tears flow. Temporary.		
	BROMBENZYLCYANIDE $C_6H_5CH\text{-}BrCN$	GAS	 Sour fruit	Eyes smart, shut, tears flow. Effect lasts same time. Headache.		
STERNUTATORS	**ADAMSITE** $(C_2H_4)_2\text{-}NHAsCl$ DIPHENYLAMINECHLORARSINE	GAS	 Coal Smoke	Causes sneezing, sick depressed feeling, headache.		
	DIPHENYLCHLORARSINE $(C_6H_5)_2\text{-}AsCl$	SMOKE	 Shoe Polish	Causes sick feeling and headache.		
SMOKES	**H C MIXTURE** $ZN + C_2Cl_6$	SMOKE	Sharp-Acrid	Harmless.		None needed
	SULPHUR TRIOXIDE $SO_3 + SO_3HCl$ IN CHLORSULFONIC ACID	SMOKE	 Burning matches	Causes pricking of skin, flow of tears.		
	TITANIUMTETRACHLORIDE $TiCl_4$	SMOKE	Acrid	Harmless.		None needed
INCENDIARIES	**WHITE PHOSPHORUS** P	SMOKE	 Burning matches	Burning pieces adhere to skin, clothing.		None needed
	THERMIT $8Al + 3FeO_4$	INCENDIARY	None	5,000 degree heat ignites materials.		None needed

ARFARE AGENTS

PREPARED BY OFFICE OF CIVILIAN DEFENSE

OTECTION	FIRST AID [After removal from gassed area]	PERSISTENCE	FIELD NEUTRALIZATION
	Undress; remove liquid mustard with protective ointment, bleach paste, or kerosene; bathe; wash eyes and nose with soda solution.	One day to one week. Longer if dry or cold.	Cover with unslaked lime and earth. 3% solution of Na_2SO_3.
	Undress; remove liquid Lewisite with hydrogen peroxide, lye in glycerine, or kerosene; bathe; wash eyes and nose with soda. Rest—Doctor.	One day to one week. Longer if dry or cold.	Wash down with water. Cover with earth. Alcohol. NaOH spray.
	Undress; remove liquid with hydrogen peroxide, lye in glycerine, or kerosene; bathe; wash eyes and nose with soda. Rest—Doctor.	One hour.	Cover with earth, caustic.
	Remove from gassed area. Keep quiet and warm. Coffee as stimulant.	10 minutes	Alkaline solution.
	Wash eyes, keep quiet and warm. Do not use bandages.	Open 6 hours. Woods 12 hours.	$NaSO_3$—Sodium sulfite in alcohol solution.
	Keep quiet and warm. Give coffee as a stimulant.	30 minutes.	
	Keep quiet and warm, bed rest. Coffee as a stimulant. Loosen clothing. No alcohol or cigarettes.	10 to 30 minutes.	Alkali.
	Wash eyes with cold water or boric acid solution. Do not bandage. Face wind. For skin, sodium sulphite solution.	10 minutes.	Strong, hot solution of sodium carbonate.
	Wash eyes with boric acid. Do not bandage.	Several days. (Weeks in winter.)	Alcoholic sodium hydroxide spray.
	Keep quiet and warm. Loosen clothing. Reassure. Spray nose with neo-synephrin or sniff bleaching powder. Aspirin for headache.	10 minutes.	Bleaching powder solution.
	Remove to pure air, keep quiet. Sniff chlorine from bleaching powder bottle.	Summer 10 minutes.	Bleaching powder solution.
None need	Produces no effect requiring treatment.	While burning.	None needed.
	Wash with soda solution.	5 to 10 minutes.	Alkaline solution.
None need	Produces no effect requiring treatment.	10 minutes.	None needed.
None need	Pack in cloths wet with copper sulphate (blue vitriol) or water or immerse in water. Pick or squeeze out particles. Treat for burn.	10 minutes.	Burns out.
None need	Treat for severe burn.	5 minutes.	Quickly cover with earth or sand.

GENERAL INSTRUCTIONS

The importance of proper first aid for gas victims cannot be overemphasized. The following are general rules which apply in all cases.

A. Act promptly and quietly; be calm.

B. Put a gas mask on the patient if gas is still present or, if he has a mask on, check to see that his is properly adjusted. If a mask is not available, wet a handkerchief or other cloth and have him breathe through it.

C. Keep the patient at absolute rest; loosen clothing to facilitate breathing.

D. Remove the patient to a gas-free place as soon as possible.

E. Summon medical aid promptly; if possible, send the victim to a hospital.

F. Do not permit the patient to smoke, as this causes coughing and, hence, exertion.

KEY

HOSPITAL CASE

FIRST AID TREATMENT

SMOKE

INCENDIARY

MASK PROTECTION NEEDED

FULL PROTECTIVE CLOTHING NEEDED

kerchief or a piece of cotton. *Do not rub the skin,* merely blot. If you can find ordinary white gasoline (*not ethyl*) or dry cleaning fluid (inflammable) or kerosene it is advisable then to carefully mop the skin with this liquid. If you have Clorox or Zonite, they may be used in place of the kerosene or gasoline. If you have bleaching powder, known also as "chloride of lime", a solution or paste of this may be put on the skin but it should be washed off very soon because *it also will burn you if left on for more than a few minutes.* Hydrogen peroxide also is excellent and harmless. Even ordinary baking soda (bicarbonate of soda) in solution or paste may be used if nothing else is available. If nothing else is available take a shower bath with soap; laundry soap is better than toilet soap. *Take a shower anyway, even after using any of the other methods mentioned.*

AFTER FIRST AID

After the first aid treatment, be careful not to rub or scratch the spot where this gas has irritated the skin because you will rub the skin off very quickly. These gases are also apt to make one cough, and to make the eyes run, itch and burn. You should be taken (do not try to walk) to the nearest aid station or hospital as soon as you have succeeded in getting off the clothing and cleaning your skin and putting on perfectly fresh clothing.

REST IS ESSENTIAL

Anyone who has breathed any poisonous gas should be *compelled to rest for many hours.* Only a doctor can tell when it is safe for him to walk. A person may feel perfectly well after breathing some of these gases, and yet become dangerously sick if allowed to walk. Call for an ambulance or a doctor if in doubt. Don't even walk victims to a hospital or aid station.

LIQUID GASES POISON CLOTHING

Clothing which has the gas on it should be left outdoors and as soon as possible should be wet with the solution of bleaching powder or should be buried or burned. Shoes which have been worn in a neighborhood where this gas has been used are also likely to be extremely dangerous and should be discarded. They will probably never again be any good. If shoes and silk or woolen clothing are treated with the Clorox, Zonite or bleaching powder solution, it will probably destroy them but it must be done just the same because otherwise they might kill you if you used them again.

LIQUID GASES POISON SOIL TOO

If these gases fall anywhere in the neighborhood of a dugout or bomb shelter under the ground, remember that they will run into a low spot just as water will. Bomb shelters below ground level, cellars, and other low places are extremely dangerous when this type of gas has been used. *You should not go in them until they have been treated* with some substance which will neutralize the gas, such as bleaching powder. The Army has special troops, and civilian personnel will be trained, to clean up any area where gas has been used, and when notified they will come and attend to this. Stay far away from such areas until they have been cleaned up!

LIQUID GASES POISON FOOD AND WATER

Food which has been exposed to gas of this type must not be used. Water which has been in an open container near this gas must not be used for drinking purposes, even years afterward. The only foods which would be safe to eat after they have been in an area where these gases have been used are those in airtight containers. Any others must be burned or buried; they can never be used.

H. L. ARNOLD, M. D.

HAWAII MEDICAL JOURNAL

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EDITORIALS

"PUBLICATION AUTHORIZED"

The delay in the publication of this issue of the Journal is due in part to the pressure of activity following the events of December 7th which delayed the preparation of material by the authors and in part to the necessity for securing permission from the office of the Military Governor for continuance of publication. That permission was finally received on January 15th, and is quoted for the record:

HEADQUARTERS HAWAIIAN DEPARTMENT
OFFICE FOR THE ASSISTANT CHIEF OF STAFF FOR MILITARY INTELLIGENCE
FORT SHAFTER, T. H.

15 January 1942

Mrs. Elizabeth D. Bolles,
Secretary & Business Manager,
Hawaii Medical Journal,
510 South Beretania Street,
Honolulu, T. H.

Dear Mrs. Bolles:

This is formal authorization for your continuance of the publication of the Hawaii Medical Journal.

One copy of each edition should be sent to the Public Relations section of this office.

In case of material of a doubtful nature your editor should consult with the head of the Public Relations section.

Very truly yours,
KENDALL J. FIELDER,
Colonel, G.S.C.,
A. C. of S., G-2.

LET'S HAVE ACTION NOW!

In 1937, the Queen's Hospital, with a bed capacity of 247, reported an average of 18.6% of its bedspace unoccupied and no need for additional bed facilities. In October, 1941, the Queen's with capacity increased to 274, reported it was without vacant beds, and estimated its additional need at a minimum of 100 beds.

In 1937, St. Francis Hospital reported an average of 5% of its bedspace unoccupied. In October, 1941, with an increase in beds to 67, it was without vacant beds, and estimated its additional needs at a minimum of 100 beds.

In 1937, Kapiolani Maternity and Gynecological Hospital, capacity 44 beds, reported an average of 19.8% of its bedspace unoccupied and no need for additional bed facilities. In October, 1941, with bed capacity increased to 51, it was without vacant beds, and was providing for as many as ten additional patients with improvised facilities. At least 50 additional beds were badly needed.

Much has happened in Honolulu since October, and especially since December 7, to aggravate these needs.

If the accepted standard is correct, namely that a hospital is to be considered as carrying a capacity load if 80% of its beds are occupied, the problem becomes more acute.

There has been much talk about permanent additions to the hospitals to meet the need; but it is obvious that none of these plans can be carried out within a year at the earliest.

Provision is to be made under army direction for the establishment of new civilian hospitals to be ready and waiting in case of disaster. These will provide beds, but cannot immediately be expected to provide the many items of special equipment which go to make up the excellent facilities of our established hospitals.

The urgent need is for temporary bed accommodations at the Queen's, at Kapiolani, and at St. Francis hospitals with sufficient personnel to care for patients occupying them.

Under no circumstances should a condition be permitted to continue which may mean denial to desperately ill patients of the facilities which our hospitals provide.

The situation calls not for plans incapable of execution at this moment, though possible sometime in the future, but for some ACTION NOW, which will increase the bed capacity of these three hospitals.

L. G. P.

MEDICAL UNPREPAREDNESS

When Territorial Delegate Samuel W. King visited Honolulu the latter part of December for the purpose of viewing first hand the results of the Japanese attack and the preparations for the future, he remarked that he had seen and heard so many good things about our defensive measures that he wondered whether we had made any mistakes at all. He was told—and we have no hesitation in repeating here—that we had.

We had devised but had not actually obtained any adequate system of air raid warnings. This point certainly requires no elaboration.

We had not agreed upon any adequate method of dimming the headlights and tail lights of automobiles for necessary night driving. One proposed method which cost about $30 per car was applied to a number of automobiles and was promptly condemned as unsatisfactory as soon as the blackouts began. The method now in use consists simply of special blue paint over the whole lens and black paint over all but a 2 inch central circle. It costs only a few cents, plus a small labor charge, per car.

No adequate preparation had been made for blacking out homes. "Practice blackouts" had been held on several occasions, but in all of them people had merely turned out their lights and then either retired for the night or sat in their front rooms to watch the darkening city. As a result of this lack of preparation, many people are still decidedly uncomfortable in their homes after dark. Ventilation of the blacked out portion of the house has been one of the most difficult problems; some have solved it by construction of a zigzag "tunnel" of black paper and lath opening either outdoors or into an open, darkened outer room, and a fan set inside the tunnel. Mainland cities please take notice: a "practice blackout" is useless unless it is held **all** night for several successive nights. Only in this way will it succeed in compelling people to make adequate arrangements for living in their blacked-out homes. The depressing effects of inadequate ventilation must be experienced to be fully appreciated.

Fire and air-raid wardens had been recruited, but not adequately prepared for their special duties. Their training is going forward rapidly now, but it might far better have been done before the attack began.

Our store of blood plasma as is recounted at length elsewhere in this issue *was inadequate.*

The point need not be further labored here; but it may be pointed out as a generality that injuries in modern war, whether they be burns, vesicant gas injuries, or trauma from high explosive bombs or shells, are likely to occur in relatively large number, and preparation to meet them should be made accordingly.

Finally, *our office of civilian defense existed only in skeleton form, and largely on paper.* Only the medical defense offices, under the auspices of the Medical Preparedness Committee of our county medical society, were actually organized and operating. The inevitable confusion that follows an enemy attack makes the organization and establishment of a local O.C.D. many times more difficult then, than during "peace" time. The lesson is obvious.

It is with the hope that our experience here may be made as useful as possible to those undertaking defense measures elsewhere, that these errors of omission are recounted. *Verbum sapientibus!*

—H. L. A., Jr.

PROGRESS IN INTERNAL MEDICINE

BLAST INJURIES OF THE LUNGS

In World War I, and again in recent warfare, the occurrence of extensive pulmonary injury, at times fatal, has been recorded in persons exposed to the effects of high explosive bombs, even though there was no accompanying penetrating thoracic wound, or other external body injury.

Experimental Study

S. Zuckerman (S. Zuckerman, Experimental Study of Blast Injuries, Lancet, August 24, 1940, 239:219-224) studied the effects of blast in animals. He records that the fatality rate was very high in animals exposed to high explosive blast effects within a distance of 15 to 18 feet, even though there were no external signs of body injury. Within this radius a sudden intense pressure of 60 pounds or more per square inch was produced. This was of very short duration and was followed by a slower sucking action of about one-fifth or one-sixth the intensity. The theories of the damaging action upon the lungs are somewhat controversial, but Zuckerman believes it is probably directly from this sudden intense pressure upon the chest wall compressing the ribs against the lungs. The pathological findings consisted chiefly of *hemorrhage*: subpleural, alveolar and intrapulmonary. Hemorrhage was most abundant in the anterior and inferior borders, and in the costal and mediastinal surfaces. There was also rupture of alveolar walls, tearing of alveolar capillaries, and interstitial hemorrhage.

Clinical Features of Blast Injuries

These were well presented in a paper by O'Reilly and Gloyne (J. N. O'Reilly & S. Roodhouse Gloyne, Blast Injuries of the Lung, Lancet, October 11, 1941), a summary of which follows:

Shock, evidenced by pallor, cyanosis, and rapid pulse of poor volume in more serious cases.

Dyspnea in all patients. The respiratory difficulty was due in part to pain, and to extreme bulging of the chest, which appeared to be in the position of almost full inspiration.

Cyanosis was obvious in most severe cases, and present in all the others.

Chest pain was of two types: a central deep constant pain (perhaps related to mediastinal hemorrhage); and a less severe pain felt more laterally and increased in intensity on deep breathing (this may have been due to contusion of the intercostal muscles).

Abdominal pain also occurred and in two cases was so severe and associated with such marked abdominal tenderness and rigidity as to lead to exploratory operation. This pain and rigidity was explained by the thoracic muscle hemorrhages, which caused irritation of intercostal nerves, or by actual damage to the abdominal muscles themselves.

Hemoptysis occurred but was usually not an outstanding symptom.

Cough did not develop until 24 hours after the injury. A number of cases then had troublesome cough, and, in many, thick mucopurulent *sputum*, sometimes stained with dark blood, appeared. Restlessness was extreme in some cases, and was due to associated intracranial blast injury.

Physical and Radiological Signs

Most frequently noted signs were: Chest three-quarters expanded, with marked reduction of respiratory movement on both sides. Resonant percussion note in the early stages. Weak breath sounds, especially at the bases. Coarse rales audible, entire lung fields. Later signs conformed to the clinical picture of lobar pneumonia at one lung base.

The characteristic x-ray finding was heavy mottling scattered in larger or smaller areas of the lung fields. This was due to interstitial or alveolar hemorrhage, and varied in density and extent, and in rapidity of clearing, with the severity of the blast injury. Pneumothorax, atelectasis, and later developing bronchopneumonia were also observed by roentgenogram.

Pathological Findings

The most striking feature in the autopsies was effusion of blood. This varied from capillary oozing to large hemorrhages. There was also rupture of elastic tissue and capillaries in the most affected parts, and secondary infection with streptococci, causing the development of bronchopneumonia.

Treatment

Treatment recommended is rest, heat, and morphia for shock. Plasma is preferable to whole blood for transfusions. Oxygen is highly beneficial. Sulfapyridine is recommended for complicating bronchopneumonias.

S. E. DOOLITTLE, M.D.

260/190

"*The importance of hypertension as a problem of health needs emphasis. High blood pressure is both a common disease and a serious one. Indeed, it appears to be more common and more deadly than cancer.*" — Allen, E. V., Medical aspects of arterial hypertension. *Bull. N. Y. Acad. Med.*, 17, March 1941.

TREATMENT of arterial hypertension today is necessarily directed in most cases toward relief and not cure. When a cure cannot be effected, or control by rest and dietary measures is impossible, the employment of medical treatment is suggested. Among the various preparations available, Erythrol Tetranitrate offers the advantage of producing a reduction in blood pressure sufficiently prolonged so that administration three times daily may maintain the reduction. It may be prescribed over a prolonged period with sustained effect.

The vasodilator action of Erythrol Tetranitrate Merck usually begins within about fifteen minutes after administration and persists for a period of 3 to 4 hours. This effect of prolonged vasodilatation, beginning within a short time after oral administration, is not obtained with any other of the commonly used nitrates.

ERYTHROL TETRANITRATE MERCK

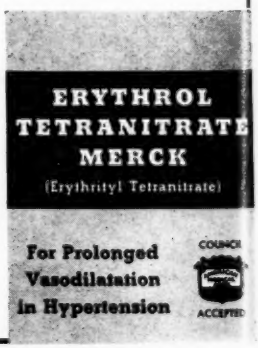
for prolonged reduction of high blood pressure in arterial hypertension

is supplied as ¼ grain tablets in bottles of 50 and 500 • ½ grain tablets in tubes of 24 and bottles of 100 and 500

ADMINISTRATION

BEGINNING OF ACTION

DURATION OF ACTION



MERCK & CO. Inc. *Manufacturing Chemists* RAHWAY, N. J.

RECENT ADVANCES IN SURGERY

THE MANAGEMENT OF WAR BURNS

This epitome on the treatment of burns is a result of a four months' tour of mainland clinics from August to November, 1941, together with observation of a series of 200 cases during the catastrophe on December 7th.

It is not my purpose to go into any arguments concerning the personal ideas regarding the virtues of different drugs or methods that many of us may prefer, but to offer what is considered the "ideal therapy" in burns.

At the outset we must discard the use of tannic acid, ferric chloride, picric acid and the like, because of their great tendency to produce a constriction and gangrene of the extremities, as well as to allow infection to be held in the burned tissue. The triple dye method has the drawback of being exceedingly messy and difficult to carry out.

Local Treatment

The treatment of choice in burns is Triethyldiazine, or sulfadiazine in triethanolamine solution, which is produced by Lederle and which we are fortunate enough to have, though only in small quantities, in Hawaii. For purposes of simplicity, we shall hereafter refer to this as Sulfadiazine Solution. It can not be made from sulfadiazine tablets, nor is any other sulfonamide preparation suitable for this use. It is applied as a spray, using an ordinary insect spray gun.

At the present we have enough of this solution in Hawaii to treat approximately 1,000 cases and a sufficient amount has been ordered from Lederle to treat at least 5,000 more. When it arrives each island will be supplied with an amount proportionate to its probable needs.

The most essential thing in the treatment of burns is that the burned area must be cleansed, and due regard must be paid to every burn, since it is an infected wound at the beginning. Therefore, before the drug is sprayed on the burned area, there must be careful cleansing, preferably with soap and water, under anesthesia, if necessary; the area is then dried and the liquid spray applied, as given in the directions to the burn teams. Besides spraying the area, sulfadiazine, 1 Gm. every 4 hours, is given for 3 days by month; and in cases with severe burns, in which infection is quite evident, Sodium Sulfadiazine is given intravenously, 0.1 Gm. per kilo in 5% solution of distilled water.

Plasma

The use of plasma is perhaps even more important than the local treatment of burns, as 80 to 90 percent of severely burned individuals die from secondary shock in the first 12 to 24 hours. The only means we have of combating this shock is by adequate doses of plasma given intravenously, preferably before the onset of shock and continued up to 48 hours or longer, if needed.

How does one determine when to use plasma? A second or third degree burn of one extremity can produce enough shock to kill a patient, and for this reason not only the depth, but also the size and distribution of the burn is, in a manner, a determining factor of the dosage. There are two methods of determining the amount of plasma for burns, and the formula below is the most accurate method. May I urge you to calculate a test case to acquaint yourself with the formula, as it requires only about 10 to 15 minutes to find the correct amount.

Formula For Determining The Amount Of Plasma Required In Burns

Normal plasma volume 5% body weight
Normal hematocrit 43
Normal plasma protein 7 gms per 100 cc
1 kilogram=2.2 lbs.

$$\text{Plasma protein deficit in grams} = 3.5\ W - \frac{W(100-Ho)\ HnPo}{2(100-Hn)\ Ho}$$

W =body weight in kilograms
Ho =observed hematocrit, per cent cells
Hn =normal hematocrit for patient
Po =observed plasma protein concentration grams per hundred cc.

The deficit in gms of protein multiplied by 14 gives the cubic centimeters of plasma required for transfusion.

"Short-Cut" Method Of Determining The Amount Of Plasma Required

A. For a 150 lb. individual 100 cc should be allowed for each point the hematocrit is elevated above 43.

B. Add 50 cc of plasma for each tenth gram per cent which the plasma is below 7.0.

C. The total amount is adjusted for the actual weight of the patient.
Example: If the hematocrit is 10 points above normal, or 53, and the plasma protein six tenths of a percent below normal, or 6.4, the amount of plasma required for a 150 lb. man would be 10 times 100, or 1000 cc., plus six times 50, or 300 cc., making a total of 1300 cc. If the patient is a 30 lb. child, only one fifth of this amount or 260 cc would be needed.

D. If total amount of this method indicates over 1500 cc required, then use mathematical formula as above.

It is essential that each burn unit have a falling drop apparatus for determining the plasma protein and also tubes for hematocrit studies. At present there is a shortage of the falling drop apparatus in Honolulu, and I should like to urge each hospital to make application or send direct to the factories for one. This apparatus may be ordered from Eimer and Amend, 205 Third Avenue, New York City, N.Y., and each hospital on the outlying islands should be supplied with these items:

Number 18131	@	$60.00
Number 18131 C	@	1.50
Number 18131 H	@	6.50
Number 18131 K	@	2.00
Number 18131 M	@	.75

Adrenal cortical extract (Eschatin), 5 to 10 cc. every 6 to 8 hours intravenously, depending on severity of the burn, has been found to decrease capillary permeability and retard the loss of plasma. It is essential, therefore, that a supply of adrenal cortical extract, in the form of Eschatin or a similar product, be on hand, and here again as in using plasma it must be started as early as possible, as both the plasma and the Eschatin help to prevent the tremendous plasma loss.

With this plasma loss, there occurs a hemoconcentration in which the hemoglobin may go up to 125 or 150%, with the RBC from 6 to 8 million. This, as you all know, means a more viscous blood, with failure to carry oxygen, and carries on the vicious circle established by the burn. For this reason, oxygen should be given, preferably by a Boothby-Lovelace mask. I can not stress too much the great importance of supplying oxygen to these burn cases, as many authorities believe that it is the anoxia which produces the liver and kidney damage which so often follow severe burns. Since there is a shortage of Boothby-Lovelace masks, a nasal catheter or oxygen tent may be used; 4-6 liters per minute is the requirement.

Infection

If the patient survives the initial or secondary shock, as well as liver and kidney damage, he may still die from infection. A burn case must be treated with the same care we demand in opening an abdomen: hence the head, face, nose and mouth of each team member must be masked. Their hands are scrubbed and sterile gloves and gowns are worn in the handling of these cases. It is believed by many authorities that most streptococcic infections of burns are introduced by the handling of the burn case, and I appeal to those of you who treat burns to remember that a burn can be infected by bad technique just the same as any other wound.

Sulfadiazine will not work if there is a lot of burned and charred material, including skin and underlying tissue, present. The wound must be made clean and sulfadiazine will act as a pliable eschar which will cover the wound and require less care than with any other burn technic. In severe burns, sterile sheets are used, the patient being placed on a sterile sheet and covered by a cradle over which sterile sheets are used.

Anesthesia

Concerning anesthesia, I feel that the experience with intravenous anesthesia on December 7th has definitely ruled it out. The anesthetics of choice when cleasing a severe burn are: first, ether; second, nitrous oxide and oxygen; and third, cyclopropane.

Morphine should be given in large doses, and frequent assurance given to the patient that all is going well.

Burn Teams

In our various hospitals in Honolulu we have organized burn teams and the routine orders are as follows:

1. All burn squads are masked to above the nose.
2. Hands are scrubbed 5 minutes and sterile gloves and gowns donned.
3. Patient is placed on sterile sheet.
4. Patient is anesthetized with ether, nitrous oxide, or cyclopropane, *not* with intravenous anesthesia.
5. Complete blood count, hemoglobin, hematocrit and blood plasma determinations are made.
6. Plasma, 500 cc, is started by vein.
7. Eschatin, 5-10 cc. every 6 hours intravenously.
8. Debridement; soap and water, scrubbing gently but thoroughly and irrigating with sterile water.
9. Spray sulfadiazine solution as debridement is progressing.
10. On return to bed give oxygen, by Boothby-Lovelace mask if available.
11. Use heat cradle, covered with sterile sheets and blankets.
12. Elevate foot of bed 18-24 inches.
13. Spray burned areas every hour during the first day, every 2 hours the second day, every 3 hours the third day, and every 4 hours the fourth day.
14. Sulfadiazine 1 Gm. every 4 hours for 3 days by mouth.
15. Morphine sulphate, gr. ¼, p.r.n.

F. J. HALFORD, M.D.

CLINICO-PATHOLOGIC COMMENT

The Clinical Laboratory has learned a lesson or two from this war.

BLOOD PLASMA

Plasma Manufacture

It has learned that the very best way to make plasma is by a wholly "closed system." The number of contaminations is directly proportional to breaks in that "closed system" technique. In wartime mass production, such a closed system technique may have to be broken, deliberately, but it then should be guarded by the aseptic and antiseptic methods of the bacteriological laboratory rather than by those of the operating room. An open wound will care for far more air-borne, or finger-borne, contaminants than will a batch of blood plasma. The technique of a tonsillectomy is to be forgotten; the technique of the bacteriological culture tube is to be remembered.

It has learned the meaning of that American slang word "bottleneck." One may have an abundance of donors, and blood receptacles; one may have a well-trained group of technologists, and adequate autoclave space,—but if one does not have ample rubber tubing, observation tubes that take a needle, and an adequate supply of 15 or 16 gauge needles, one is tempted to break technique, and that leads to great losses of plasma.

It has learned that suitable publicity and executive ability are prime requisites for the operation of a rapidly producing plasma bank, but *it has also learned* that competent and authoritative technical supervision are equally essential. It is better to cut the yield in half than to lose half the yield.

It has learned that the time to organize a whole-blood bank, with a large list of donors, typed and tested, is before the crash and not after it. Types do not change; and an intercurrent luetic infection in the donor would mean little to the Service man losing a leg or an arm or 18 inches of gut. This is War Medicine, comparable to the War Surgery of which Dr. Moorhead spoke, and which he *practiced*.

It has learned that whole blood can be transported long distances, thirty or forty miles in a car, with practically no hemolysis or deterioration —if the stoppers are sterile rubber and not loosely fitting cotton-gauze.

It has learned that De Gowin *et al's* method of preserving whole blood is a good one, effective for 25 to 30 days, and thereafter it yields diluted plasma that should be ideal in burn cases. A modification, devised to suit war conditions, was to use the usual bleeding apparatus with 100 cc. of sodium citrate—2% of it was the type with 2 molecules of water, and 3.2% of it was the type with 5½ molecules of water (please look at the label of the bottle on your shelf!)—to draw 500 cc. of blood, preferably group O or Moss IV: universal donor. The remaining blood in the donor hose was massaged into the attached tube, tested for syphilis and blood group, and then immediately siphoned by closed system into a Cutter, Abbott or Baxter bottle, 1 L (really with a capacity of 1100 cc.), which contained 500 cc. of ice cold glucose solution, 5.4%. This then went into a refrigerator running at 4° C. There was no sense in complicating the picture by attaching 2 tubes to the blood receiver using up precious adhesive; one tube with a half inch of cotton in the bottom sufficed. The cotton preserved the point of the needle—and what *pilikia** "hooked" needles made during those days from December 8th to December 24th! The clotted blood yielded ample serum for lues serology, and some saline on the clot gave abundant cells for blood grouping. For attaching the blood sample test tube to the bleeding apparatus, size 64 rubber bands were found superior to adhesive plaster—and more economical.

Contamination and Decontamination

It has learned that plain infusion broth is a very poor indicator of contamination in plasma. A light inoculum of aerobes gives a low percentage of positives; and of anaerobes, practically none. *Brewer's medium* is far superior and was found most useful. It grows aerobes, microaerophiles and anaerobes very well. Attention was

* *Pilikia*—Hawaiian for trouble, harm, difficulty, or the like.

previously called to this medium here in Hawaii in the October 1941 issue of the Proceedings of The Clinic, Honolulu, while a practical and economical method of its use was reported in the March 1941 issue of these same Proceedings. In brief, Brewer's medium is a clear liquid medium, made from pork rather than beef, and contains sodium thioglycollate to maintain anaerobiasis in the base of the tube, 0.05% agar to cut down convection currents, and .0002% of methylene blue as an indicator of oxygen saturation. It can be bought in dried powder form; it can be homemade if you have some sodium thioglycollate. To make 6 liters:

5 pounds ground lean pork.

6 liters of water; infuse in icebox over night, boil 5 minutes, cool, and siphon off underlying clear infusion.

Peptone, preferably "thio" or proteose #3 Difco	60 g.
Dextrose	60 g.
NaCl	30 g.
Sodium thioglycollate	6 g.

Dissolve, with heat if necessary, bring to 6 L. Set reaction to pH 7.4 or 7.6 (about 12 cc. of 10% NaOH required.) Filter through thick layer of cotton and then paper.

Add 3 grams of dissolved agar and methylene blue, 0.5% aqueous solution 2.4 cc. Dispense and autoclave as usual.

Tall narrow tubes (20 cc.) very slowly (weeks) get blue at the top, indicating oxygen penetration.

At The Clinic laboratory it is put in one ounce oval prescription bottles with bakelite molded screw cap. We bore a 3/16 inch hole in these caps, remove the inner paper liner and substitute one cut from heavy—truck weight—inner tube rubber. Having filled the bottle with 20 cc. of medium, the cap is screwed on tight and the remaining air exhausted with a fine hypo needle and suction from a filter pump, the screw cap covered with paper and rubber band, and the whole autoclaved. In culturing plasma, the rubber stopper of the plasma bottle is painted with dilute iodine in alcohol, and with a sterile 2 cc. syringe and 18 or 20 gauge needle 1 cc. of plasma is withdrawn. The paper cover of a culture bottle is removed and the needle of the syringe plunged through the rubber diaphragm, and the vacuum sucks the plasma into the bottle. The culture bottle is then "breathed" to atmospheric pressure by a sterile needle with attached 3 inches of rubber tube, stuffed with cotton, all sterile, of course. This "breather" is lightly flamed after each bottle is brought to atmospheric pressure. Two physicians, with the help of two technologists to uncover and cover flasks and bottles, and equipped with only 17 syringes and needles which are boiled 5 minutes after use, can make a hundred cultures with ease in an hour.

The Clinical Laboratory has learned that in proportion of 1 cc. of plasma to 20 cc. of Brewer's medium, the merthiolate present, in 1:10,000 concentration, has practically no inhibitory effect; sterile cultures of plasma in Brewer's medium, subsequently lightly inoculated with pathogens and nonpathogens, give good growth.

It has learned that most contaminated plasma cultures give good visible growth in 24 to 48 hours, particularly with the anaerobic streptococcus, (probably of fecal origin) which was our bête noir—but that *it is not safe to make a final reading before the seventh day.* Some staph and diphtheroids (the latter giving a pale pink tinge to the medium) take 5 or 6 days to give visible growth. Incubation to the 14th day, as advocated by the Blood Transfusion Association, seems to us like painting the lily—and these are war times.

We at The Clinic worked with some 500 cultures, and it has been our experience that bacterioscopic examination of clear cultures never yielded positive results; however, some cloudy cultures were bacterioscopically negative—this holds good particularly for the homemade Brewer's medium. In other words, visual examination of the cultures is very trustworthy—only cloudy or doubtful cultures need, in practice, to be examined bacterioscopically.

The Laboratory has learned that if contaminated plasma (particularly if the contamination be the anaerobic streptococcus referred to) is ultimately filtered through 200 mesh wire gauze and then through a 2 x ½ inch Berkefeld candle, with positive pressure, the yield is about 200 cc. in 15 minutes, before the cylinder clogs. It has been suggested that if this plasma were put through a Sharples centrifuge—continuous clarification, like a milk separator—and then fed to a 10 x 2 inch Berkefeld candle, the yield would be 20 times the laboratory experiment; in other words, two liters per hour. In that fashion it would take only 250 hours to filter 500,000 cc. of contaminated plasma with one candle. It is to be hoped that the merthiolate in the contaminated plasma will have held that streptococcus static.

It has been found that if a flask of strep-contaminated plasma be supersaturated with sulfanilamide and returned to minus 15° C, nothing

happens and the strep stays cheerfully, malevolently alive. *But,* if another such strep-contaminated flask of plasma be treated with sulfanilamide to a concentration of only 31.3 mgm.%, and returned, not to the icebox, but to the 37° incubator, for 24 hours, all subsequent cultures are sterile, even if made in Brewer's medium to which has been added 7 mgm.% p-amino-benzoic acid to neutralize the effect of the sulfa compound. (See Janeway, Chas. A., J.A.M.A., 116:941-942, March 8, 1941.) This plasma shows no veil thrombin clot nor granular precipitate in the first 24 hours—though there is some precipitate after 72 hours. If such plasma—sterile, sulfa-containing—be administered in 250 cc. amounts to a 150 pound man, blood content 5 L, the final concentration in him would be but 1.56 mgm.%. Don't ask the Clinical Laboratory, however, what has happened to the albumin-globulin ratio, prothrombin, strep. toxin, and autolysate content, in the interim! "But these are war times."

However, contaminated plasma—with the anaerobic strep (shades of Semmelweiss!!) treated with sulfa compounds to sterility—injected intravenously into a rabbit in doses comparable to clinical use, didn't even make the rabbit bat an eye or wiggle an ear.

Pooled Blood

The Clinical Laboratory has learned that whole blood may be pooled almost as safely as plasma. The theory that antagonistic isohemolysins would cause hemolysis did not find consistent verification. For hemolysis, the presence of complement is a requisite, but sodium citrate is anticomplementary, and was present in most of the bloods in excess. At The Clinic we pooled for a time, while the need for rapid turnover of bleeding receptacles was acute, four 600 cc. bloods in tall, narrow 2 L Cutter bottles. A little hemolysis resulted at first from the direct fall of blood and frothing; this was overcome by having the funnel deliver against the bottle wall. However, we did lose two such pools by very marked hemolysis, the cause of which remains a mystery; unfortunately, we did not culture these two batches. I am informed that the Central Bank also lost two such batches from the same cause.

Making Plasma: Futher Considerations

The Clinical Laboratory has learned that while "99.44%" of its time and personnel were diverted to plasma production under war time conditions, it was still supposed to be almost 100% efficient in urinalyses, blood cultures, blood chemistry, syphilis serology, histopathology, and the like.

Personally, I'd like to know who the hell ever wished the Plasma Bank off on the Clinical Laboratory, with little or no authority, less credit, and much blame; that plasma bank really belonged, not in the hands of an ophthalmologist, nor in the hands of a busy clinical pathologist, but in the hands of one of the very, very many Ph.D.'s, on the fringe of Clinical Medicine, who were specially trained for this type of work, and preferably one with a little inventive genius.

Administering Plasma

The Clinical laboratory has learned that the making of plasma is beset with many difficulties; there are, however, an almost equal number of difficulties in its administration, and many clinicians unfortunately seem to know as little of this matter as the proverbial hog knows of hip pockets. If plasma be made from blood in a minimum of time at a minimum temperature, preserved frozen, and melted at 37°, it is usually clear and may be administered as is. *Plasma made under any other conditions must be filtered*—first, to keep from plugging the needle, and second, to keep from plugging the recipient's pulmonary capillaries. It is silly to try to give Hawaii's plasma bank product direct from the bottle without filtration.

The Clinical Laboratory found, on December 7th, an inadequate number of infusion sets, plus standards, to give the plasma needed. The censor would probably not let me be more specific. However, within a very short period of time, when the gum tubing, observation tubes and 19 gauge needles—that came in place of the 16 gauge ordered for the "bleeders"—arrived, we improvised quite a large number of infusion sets. With an electric hot wire we cut the bottoms out of 1 L Cutter bottles, which could then still be suspended by their hoop and bail, the hoop also serving to anchor a single covering layer of close-mesh gauze. The neck of the bottle received a perforated rubber stopper, holding on the inside of the bottle a 100 mesh monel screen thimble, and on the outside, a glass tube which connected with the rubber hose that ran to the patient (preferably via a Kaufmann-Luer syringe). With this apparatus it is simple to begin a saline infusion on a patient in grave shock, switch to as much filtered plasma as seems needed, wind up with sterile saline—and move on to the next casualty without further thought of sterilizing anything but the needle.

On that memorable Sunday morning, there was an abundant supply of sterile saline in liter lots—God bless the man that had the good sense to get that material in advance.

PLASMA DOSAGE

The Clinical Laboratory has learned that when a battleship gets a direct hit and there are many burn casualties, plasma is the ideal therapy. That we knew before the blitz. Ravdin said that a burn case should have a quantity of plasma dictated by a conjunction of the patient's hematocrit reading and his plasma protein level—and I said once before, that if one had a big plasma bank and a good bookkeeper, one could follow Ravdin's tenets. Hematocrit readings, however, sew up a centrifuge that is terribly busy making plasma, and plasma protein specific gravity determinations are so dependent on the slow, *unhurried* method in which the pipette is withdrawn from the xylene-brombenzene tube. During, or just after an attack, one would be apt to distrust plasma protein determinations from the average clinico-pathological laboratory. Be all that as it may, I should like to emphasize one fact—i.e., I have not yet seen a report in the medical literature of death attributable to an overdose of plasma.

It is suggested that the following might serve as a clinical rule of thumb method for grossly and rapidly determining plasma or serum proteins. Plasma (or serum, taken just as for a Wassermann) is diluted 1:50 in saline. 1 cc. of this dilution is placed in a 25 cc. flask or tube and 4 cc. of 3% sulfosalicylic acid is added rapidly and under constant conditions (as in making Kahn antigen.) The nephelometric density may then be read in a standardized photocolorimeter, or compared visually with colloidal mastic standards previously made and calibrated.

MAKING TYPHOID VACCINE

The laboratory found that it could safely make a comparatively large quantity of typhoid vaccine if needed, in a rather short period of time, *by adaption of the plasma culture method.* Flat-sided, one-quart, prescription bottles with molded screw caps were used for culture bottles. The caps were bored with a 3/16 inch hole and the paper inner liner replaced by a rubber washer of inner tube rubber. Enough agar was introduced to cover the flat side when the bottle was laid down. The screw caps were closed tightly, the air exhausted with fine hypo needle and filter pump, the caps covered with heavy paper, and the media bottles autoclaved in the usual fashion and laid on their sides when sterile. When hardened, they were incubated to insure sterility, but moisture was conserved by the tight stopper.

Seed was grown from picked colonies of the Boxill strain of typhoid bacillus, on agar slants; these were carefully inspected and washed down with sterile saline. This seed suspension was transferred to a leveling bulb, to which was attached rubber tubing with a clamp and a glass observation tube on which was mounted an 18 or 20 gauge needle. For planting, an assistant carefully removed the paper cap from a culture bottle, the rubber inner liner was pierced by the needle, and enough seed was introduced to lightly cover the surface of the agar when the bottle was rocked. The culture bottle was then "breathed" to atmospheric pressure by the "air filter needle", the paper cap replaced, the bottle laid on its side for an hour or two, then placed erect in the incubator for 18 to 20 hours.

Reaping was accomplished by filling another in 1:10,000 concentration, the bulb being equipped leveling bulb with sterile saline plus merthiolate with base and needle as with the planting equipment. With this apparatus about 30 to 50 cc. of saline could be introduced through the rubber inner liner before positive pressure stopped the flow. The paper cap was then replaced. (Permanent paper caps were made by fitting the paper snugly in place with a rubber band, binding with scotch tape, and trimming off excess paper).

The bottles were then rather vigorously agitated until all the culture was washed down; this was greatly simplified by the abundant moisture present during incubation.

The first reaping took place into storage bottles similarly prepared with perforated molded cap, rubber inner liner and paper cover, autoclaved empty. The reaping hose was equipped with a needle at each end and an adaption of the Baxter filter drip with 100 mesh wire cloth in the liner.

The culture bottle with washed down culture was suspended upside down in a ring stand, the paper cap removed, and one needle plunged through the rubber liner. The other needle was similarly inserted in the collection bottle. Vacuum was created in the collection bottle by inserting an air filter needle attached to the vacuum line, thus the very concentrated vaccine was collected

in the storage bottle. This bottle was then wholly immersed in the 56° C bath for 60 minutes. Thereafter material for sterility control and toxicity and dilution standardization was removed with sterile syringe and needle, after iodinizing the stopper.

The strength of the vaccine was standardized nephelometrically in a Klett-Sumerson colorimeter with a blue filter. Army vaccine was used as a standard, and the sample of vaccine was diluted until it gave a similar reading after calculation, the concentrate being diluted with 1:10,000 merthiolate in saline.

The Boxill strain is highly antigenic; rabbits used for toxicity control, which were subsequently given larger intravenous doses, yielded a very high titer diagnostic serum.

WAR GASES

Our laboratory has learned that it was woefully deficient in its knowledge of war gases and methods of their determination. Lewisite contains organic arsenic and it was our hope that the old Abelin reaction—a very simple one which will detect neoarsphenamine in a concentration of only 0.000185 Gm. per 10 cc. or mapharsen in a concentration of 0.00005 Gm. per 10 cc.—might be useful in detecting this gas in materials or body fluids; it is still, however, only a hope.

It is our understanding that lewisite contains arsenic in organic form but liberates it in the form of arsine - AsH_3. A simple test, such as the old Gutzeit test, might suffice for qualitative purposes. A drop of 50% silver nitrate is placed on a piece of filter paper and the moist spot held over a test tube containing some zinc, dilute sulphuric acid and the substance to be tested for arsenic. A plug of cotton is inserted near the top to protect the paper from being spattered by the effervescing solution. If arsenic is present, the spot becomes yellow and turns black when moistened with water (Holleman and Cooper.)

The Clinical Laboratory has learned that the internist needs only a stethoscope and his brain, the surgeon only a few tools and his judgment, but the laboratory needs thousands of bits of material—and material is hard to get in war times. But the laboratory was happy to learn that it still was needed, in war as much as in peace.

E. A. FENNEL, M. D.

ORGANIZATION OF THE HAWAII SOCIETY OF CLINICAL PATHOLOGISTS

On Nov. 13, 1941, a meeting was held at the Mabel L. Smyth Memorial Building for the purpose of organizing a Society devoted to the promotion of the science and art of clinical pathology. Some 18 potentially interested physicians were invited to attend, of whom 10 were able to be present. It was unanimously agreed that the organization of such a society was desirable and a tentative constitution and by-laws were adopted. Dr. Carl F. Tessmer was elected president and Dr. I. L. Tilden secretary-treasurer.

The constitution provides that the membership of the Hawaii Society of Clinical Pathologists shall consist of two classes of individuals: *active* members, who are duly qualified medical graduates either limiting their work to the practise of clinical pathology or maintaining an active interest in this field, and *associate* members, who are not medical graduates but who devote their time to some branch of laboratory medicine. Activities envisioned for the Society include a regular meeting once a month at which prepared papers by the members will be presented, and smaller seminar meetings which will be devoted to the study of interesting and unusual neoplasms.

The first regular meeting was held on Nov. 27, 1941, with an attendance of approximately 75. Dr. E. A. Fennel, in an informal talk, sketched the development of pathology in Hawaii during his twenty years' residence in the Territory. He described conditions as they were when he first came to Honolulu—almost no, or at best very crude, laboratory facilities—a far cry from our present modern and well equipped laboratories. The program was closed by a joint paper entitled "A Consideration of Common Diarrheal Diseases of Bacterial Origin," presented by Dr. I. Kawasaki, Dr. A. S. Benenson and Dr. P. P. Green of the Department Laboratory at Tripler Hospital. The enthusiasm of those attending the first meeting speaks well for a long and active existence of the new Society.

I. L. TILDEN, M.D.

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MEDICAL PREPAREDNESS

Dr. Moorhead, in carrying out a commission from the Office of Civilian Defense in Washington, acquainted himself with the activities of the Preparedness Committee and toured some of the aid stations immediately upon his arrival. His comments on this work were:

> "I had the opportunity of going over some of the arrangements your society has made in respect to civilian casualty possibilities, at the request of the Office of Civilian Defense on the mainland, and when I go back and make my report I am going to say that your preparation here is much farther advanced than anything I know of on the mainland."

WELA KA HAO!

RCA Radiogram Received:

December 9, 1941, 1:20 *PM*

WASHINGTON DC US GOVT 9 232P

HAWAII TERRITORIAL MEDICAL ASSOCIATION

OFFICE OF CIVILIAN DEFENSE REQUESTS YOU URGE ALL HOSPITALS TO ESTABLISH IMMEDIATELY EMERGENCY MEDICAL FIELD UNITS IN ACCORDANCE WITH PLANS OUTLINED IN MEDICAL DIVISION BULLETINS NUMBER ONE AND TWO AND DRILL WEEKLY. WHERE NECESSARY RESERVE FIELD UNITS SHOULD ALSO BE ORGANIZED WITH MEDICAL NURSING AND TRAINED VOLUNTEER PERSONNEL DERIVED FROM THE COMMUNITY URGE IMMEDIATE ACTION.

GEORGE BAEHR MD CHIEF MEDICAL OFFICER

Our reply, we hope, was adequate:

"Your wire of December 9 was duly received on the same day.

"For your information please be advised that our first emergency field unit was demonstrated with full equipment, ambulance, and personnel on Army Day, April 4, and that since that time 18 such units with a complement of 120 personnel each, have been trained and set up throughout the City of Honolulu.

"This was all done at the initiative of the Honolulu County Medical Society under the guidance and direction of Dr. Robert B. Faus, who has since been made a major in the Army. Since April a committee of medical men voted in by the Medical Society, with Dr. Harry L. Arnold, Sr., as chairman, has been devoting itself to the furtherance of these units and to the procurement of ambulances, equipment, etc.

"On the morning of December 7 these 18 units went into action within an hour, and the Preparedness Committee had 100 trucks rolling within an hour, some immediately, to go to the scene of combat at Hickam and Pearl Harbor for the transportation of casualties to the Army Hospital.

"Only two of our medical aid units had actual casualties, the details of which we would be glad to send you if you are interested, but all were in readiness to give full service.

"In addition to the above, some twenty civilian surgeons and doctors reported immediately at the Army Hospital upon their call for assistance at 9 a.m. Sunday, December 7, and most of them worked throughout the day, the last one reporting in at midnight. Other physicians were standing by to be sent whenever a call for need came in. This teamwork on the part of the physicians and surgeons was in part due to the organization in advance of surgical teams and hospital assignment of doctors as part of the preparedness program, under Dr. Arnold.

"Enclosed are some tear sheets from our medical journal which will give you some details regarding our preparedness program."

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*Wela ka hao: "Strike while the iron is hot"; literally, "hot the iron."

HONOLULU

The scoffers and the sceptics have had their comeuppance— "It couldn't happen here"—but it did. The wisdom of our military advisers in urging us to make the preparations we did, the adequacy and efficiency of the Plans and Training program of Dr. R. B. Faus, and the patient tireless work of the aid station doctors and unit members over the long, hot months have been thoroughly vindicated. The financial and material aid given by the Chamber of Commerce, the American Red Cross and, belatedly, by the City and County, have turned out to have been wise investments.

Within twenty minutes after the attack began, headquarters staff began the previously arranged program of telephone calls to alert the units and the emergency ambulance fleets. (It must be admitted that it would not have functioned so well on a week-day, however.) Within the first hour calls for 100 ambulances to Hickam Field were met promptly, and aid stations were receiving casualties and transferring them to hospitals. None of our rehearsals had run so smoothly or swiftly as did the real thing when it came.

One of the units, located at Lunalilo School, was actually hit by a Japanese bomb and the building set on fire, and the unit had to be immediately evacuated to another portion of the building where it continued to function and care for the casualties caused by the bomb.

By a remarkable coincidence, one of the series of lectures on traumatic surgery being given by Dr. John J. Moorhead (by arrangement of the inspired committee on postgraduate study of the Honolulu County Medical Society) was set for 9:00 A.M. on Sunday December 7th and was just under way when the call came for the assigned surgical teams to report to Tripler General Hospital at Fort Shafter. The messenger entered the auditorium just as Dr. Moorhead had quoted "Therefore be ye also ready, for in such an hour as ye think not the Son of Man cometh" (Matt. 24-44). Well, we were ready and in less than 15 minutes the men, twenty civilian surgeons and physicians, Dr. Moorhead with them, arrived at Tripler to stay there all day, many of them till nearly midnight.

The very fact that Dr. Moorhead was here to organize the surgical work sheds definite credit upon our medical society. Our Post Graduate Committee had had the foresight to arrange, for its annual lecture course, a series of lectures on traumatic surgery and they selected for this the best man they could have had, I am sure, to give them. No rounder peg ever was fitted into a round hole.

A central dispatch station was set up to locate and dispatch doctors throughout the day and night in response to calls from the military or the public for medical aid.

The American Red Cross during the acute emergency fed units and ambulance fleets, which were on duty 24 hours a day, and furnished bedding for personnel who had to sleep near their jobs. This additional assistance rendered us has been of the highest usefulness. Too much praise cannot be given them.

In addition to supplies furnished to the units by the Army and the American Red Cross, the supply division of the Office of Civilian Defense under Dr. Thomas Mossman, City and County physician, functioned as a supply depot sending requisite medical and hospital supplies to units and hospitals.

The plasma bank, suggested in December 1940 by Dr. Eric Fennel and organized and established last fall by Drs. Pinkerton and Devereux under the Chamber of Commerce, had a good supply of plasma; but, of course, nothing adequate to meet such a demand. The stock on hand was at once distributed to naval, military and civilian hospitals and steps were taken immediately to expand the bank rapidly and enormously. Where-

MEMO TO: Dr. H. L. Arnold, Office of Civilian Defense.

FROM: Headquarters Hawaiian Department—January 19, 1942.

Request that the following statement, which has the approval of the Department Commander, be published in the Honolulu County Medical Journal:

"The Commanding General, Hawaiian Department, wishes to take this opportunity to thank the physicians and their assistants for the splendid aid and cooperation rendered on December 7 and the period following in the care of the wounded. All did a superior job."

For the Department Surgeon.

(Signed) SIDNEY POSNER
Captain, Medical Corps.

as publicity and appeals had brought only a limited number of donors during the two months of the blood bank's operation, by noon of that fateful Sunday donors were thronging the hospitals and bleeding stations and continued to come for days. Doctors, volunteering their services, patiently did vein punctures hour after hour in three shifts for two weeks while laboratory technicians spent equally strenuous days and nights coverting the blood into plasma. The Medical Corps of the army arranged for absolutely essential equipment or supplies to be brought in by plane when the local supply was exhausted. A supply of dried plasma is now being imported from the mainland to serve as a stable reserve in case of a sudden, urgent need for a larger quantity than could be supplied by the bank. The demand for plasma was quickly caught up with and passed, and at present it is being made at "cruising speed" and is being stored against possible further needs. From the Commandant of the 14th Naval District came words of appreciation for the service thus rendered to our men of the fleet.

Office of the Commandant
FOURTEENTH NAVAL DISTRICT
and
Navy Yard, Pearl Harbor, Hawaii, U.S.A.

January 2, 1941

Dr. Harry L. Arnold
Office of Civilian Defense
Honolulu, Hawaii

My dear Doctor Arnold:

The district Medical Officer and the Commanding Officer, U.S. Naval Hospital, Pearl Harbor, inform me that the Honolulu blood and plasma bank collected, processed and supplied approximately 500 flasks of blood plasma to the Naval Hospital during and subsequent to the emergency of December 7, 1941. As the emergency developed the immediate availability of the plasma prevented much suffering and loss of life among naval personnel casualties.

The commandant wishes to convey to you his appreciation for this fine deed and for the excellent spirit of cooperation shown by all members of the blood bank in making available for naval needs, plasma which previously was designated for civilian defense requirements.

Please convey my thanks to Dr. F. J. Pinkerton and Dr. John Devereux for their splendid work in establishing and directing the work of this activity. I should like to have my thanks conveyed to all the people of Honolulu who so generously responded to the call for donors and thus made this work possible.

Very truly yours,

(Signed) C. C. Bloch
Commandant, 14th Naval District
Rear Admiral U.S. Navy

There is an old saying that the practice of psychiatry is largely the acquisition of a vocabulary. Well, the people who regard psychiatrists as impractical theorists should have seen what happened at the Territorial Hospital for the Insane the day of the attack. This group of men, all specialists in the treatment of mental diseases, were faced with the sudden necessity of performing tremendous amounts of every major surgery, and they responded to it nobly. They did not permit, perhaps neither would the censor permit, the publication of details of what was done over there; but it is safe to say that it was something for every psychiatrist and medical man in the country to be proud of. Someday, perhaps, the whole story may be told; but in the meantime Dr. Stevens and his staff deserve the hearty praise which they will some day receive.

On December 17th Dr. Perrin Long of Johns Hopkins Medical School and Dr. I. S. Ravdin of the University of Pennsylvania arrived by plane to survey the medical and surgical situation resulting from the attack. They spent many hectic days and nights interviewing the doctors, nurses and officials concerned and departed with their data. They were definitely profuse in their expression of praise for the work which the civil medical and nursing profession have rendered in the emergency.

Since the first tense days a considerable amount of shaking down and reorganization has taken place, naturally. Each aid station now has a skeleton stand-by crew of 16 paid attendants with volunteer members up to a total of 75 in reserve, ready to step in should the need arise. Our demonstration unit has been made a mobile unit, their supplies packed up ready to go whereever it might be needed. The personnel, meanwhile, will be used as reliefs for other units.

The surgical teams have been re-arranged by Drs. Strode and Judd and reassigned, and a complete staff set up for each hospital with a chief of staff in charge. Teams for the treatment of severe burns are also assigned, organized and equipped for their work under the direction of Dr. Halford. (See Honolulu Advertiser for details.)

Dr. Stewart E. Doolittle has been designated as in charge of instruction of doctors, nurses and others connected with the hospitals in the manner of decontaminating and treating gas casualties. Each hospital will have a doctor assigned to this duty and under him will be teams of men who have been trained and equipped in the manner prescribed by the Chemical Warfare Service of the Army for the treatment of these casualties. In addition, a director of each aid station is receiving such training and he will be given a crew of highly trained men adequately equipped for this work. The Chemical Warfare Service of the Army has designated the aid stations of this organization within the city to be used as distribution centers for gas masks; their distribution began Jan. 21, and over 24,000 masks were delivered within the first 12 hours. As this is written 146,000 more masks are still in the possession of these stations ready to be issued as soon as the word is received. On December 18, in Mabel Smyth Memorial Auditorium, Colonel Unmacht of the Chemical Warfare Service, and Lieutenant Colonel Green of the Medical Corps of the army gave very instructive lectures on the management of gas casualties from both the lay and the medical points of view, following which the doctors and nurses who had not yet had gas mask training were given a short training period on the lawn *mauka*[1] of the building. A pamphlet on the medical management of gas casualties was prepared by Colonel Green; this has already been distributed to all the doctors of the island and will shortly be distributed much more widely as soon as additional copies are available. Dr. Payne, chairman of the local chapter of the American Chemical Society, has appointed Dr. Hance, chemist of the Hawaiian Sugar Planters Association, as chairman of the committee to train personnel in decontamination methods.

H. L. ARNOLD, M.D.
Director, Emergency Medical and Ambulance Service,
Office of Civilian Defense

[1] *Mauka:* Hawaiian for "toward the mountains"; in Honolulu, approximately northeast.

HONOLULU BLOOD AND PLASMA BANK

To Honolulu, a small American city, goes the distinction of operating the first plasma bank in this country under actual conditions of war.

The idea of storing blood plasma is not associated exclusively with warfare. In 1938 Dr. Nils P. Larsen, Medical Director of The Queen's Hospital, used placental blood as storage for transfusions. However, the amount of blood from this source appeared to be too small to justify the effort. In 1939 Dr. Robert B. Faus, in his capacity as City and County physician, enrolled a large number of prisoners as blood donors for ill or injured firemen, policemen and other city and county employees. The blood of each volunteer was typed and tested serologically, the donors receiving the nominal sum of $10.00 for each transfusion. Dr. Faus' plan called for both blood transfusions and preparation and storage of plasma. An appeal to the City and County of Honolulu and later to the Public Health Committee of the Chamber of Commerce of Honolulu for funds to purchase equipment and a refrigerator failed, thus preventing the accomplishment of the latter aim, but the first phase of the program has been in continuous operation for over two years.

As war spread throughout Asia, Africa and Europe, the possible involvement of the United States became more and more a problem with which to reckon. Medical men everywhere, recognizing the new status of civilians in war time, urged the value of blood and blood plasma as an essential medicine for injuries involving severe shock or burns as well as loss of blood.

In Honolulu, Colonel Edgar A. King, Chief Surgeon, Hawaiian Department, United States Army, was urging upon community leaders and the medical profession the desirability of procuring and holding a supply of blood plasma for protection of civilians in the islands. To undertake such a project, leadership and funds were necessary. In December 1940, Dr. Eric A. Fennel had suggested to the Chairman of the Public Health Committee of the Chamber of Commerce that a blood and plasma bank be established and was asked to set forth his suggestions in letter form. This was done on December 26, 1940.

When this communication was read to the Public Health Committee, Dr. John W. Devereux, representing the Public Health Committee of the Junior Chamber of Commerce, expressed the interest of his organization in such a project and it was referred to the Junior Chamber of Commerce for consideration and preparation of plans.

In February 1941, an outline of the proposed blood and plasma bank was presented for final consideration to the Senior Chamber and a com-

mittee was appointed to supervise the inauguration and operation of the work. This committee included Dr. Forrest J. Pinkerton, chairman; Dr. John W. Devereux, Dr. Eric A. Fennel, Lieut. Colonel Philip P. Green (representing Colonel King), Dr. M. F. Haralson, Territorial Commissioner of Health; Dr. Nils P. Larsen, Medical Director, The Queen's Hospital; and Dr. Thomas Mossman, City and County Physician. Dr. Louis Hirsch, in charge of the laboratory at The Queen's Hospital, was later appointed to represent Dr. Larsen.

Principal provisions of the plan were:

(1) A central bank to be established at the City and County Emergency Hospital to draw blood and prepare plasma.

(2) The Hawaii Chapter, American Red Cross, to be in charge of publicizing the project and securing donors.

(3) The plasma supply and its production to be under the direction and control of the Public Health Committee of the Chamber of Commerce of Honolulu.

(4) No blood or plasma to be offered for sale.

(5) The central supply to consist of 100 flasks of plasma, 250 cc each.

(6) Certain equipment to be purchased for hospitals on Oahu desiring to prepare plasma in addition to that of the central bank.

A budget of $2,000, later increased to $3,000, was appropriated to convert space at the City and County Emergency Hospital into a laboratory, to purchase equipment and to pay salaries. Dr. Devereux was employed as manager of the bank with Mrs. W. B. Herter supervising the laboratory. Eight hospitals agreed to participate in the program: Kauikeolani Children's Hospital, Japanese Hospital, Kapiolani Maternity and Gynecological Hospital, The Queen's Hospital, St. Francis Hospital and Leahi Home,—all of Honolulu—and Ewa Plantation Hospital, Ewa, Oahu; and Territorial Hospital at Kaneohe, Oahu.

After four months of preparation and securing equipment from the mainland, the first blood was drawn on June 2, 1941. Response from the community was slow: when the bank opened only 30 donors volunteered, and these were chiefly members of the Junior Chamber of Commerce.

Thru newspaper and radio publicity, window displays and personal solicitation, a schedule of bleeding 9 to 12 donors a week was maintained. At the end of three months, when the appropriation and volunteer donors were exhausted, 96 men and women had given blood and 77 flasks of plasma were on hand.

At this time an additional appropriation of $1,000 from the Public Health Fund of the Chamber of Commerce was made and a plan approved for doubling the goal to 200 flasks and speeding operations to care for about 30 donors a week. Under the new schedule, within five weeks 153 donors had given blood and the goal of securing enough blood for 200 flasks had been passed. Group solicitation was responsible for the increased number of donors.

It may be of interest to note that the cost of the last 138 flasks came to $7.25 per 250 cc as compared to the cost of $19.50 to $27.50 per 250 cc flask for commercial plasma.

On November 13, 1941 the blood bank closed its doors, but several more weeks were required to draw and culture plasma, take inventory of equipment and plan for its disposition. On December 1, 1941, 203 flasks of plasma were placed in the cold storage warehouse at the Hawaiian Electric Company, and plans made to turn the central laboratory over to the City and County Emergency Hospital for an indefinite period. And so one more project was concluded, one more accomplishment was credited to the Honolulu merchants who contribute to the Public Health Fund—and, as fate would have it, none too soon.

One week later came that never-to-be-forgotten Sunday, December 7th, when our army and navy bases were attacked and an urgent appeal went out for plasma. 80 flasks of plasma were immediately distributed to The Queen's Hospital for civilian use; Tripler General Hospital received 75, and 45 were immediately dispatched to the Pearl Harbor Naval Hospital. Within six hours the total supply, the product of months of effort, was exhausted.

The doctors who attended the wounded that day tell of men who were carried in very evidently marked for death and they also tell how many of these men still live because of the life-giving plasma poured back into their veins—it worked miracles! "Thank God," they say, "for the plasma!"

This is the story of some 200 flasks of plasma, stored against an emergency that all Honolulu hoped never would come.

But there is an even more dramatic sequel to this story—the sequel beginning December 7, 1941—and it is the story of the response of all

Honolulu, shocked by its first realization of what war means.

A call for donors was broadcast over local radio stations and the response was overwhelming. From a previous maximum of 8 donors a day, 4 days a week, volunteers were now being bled at the rate of 50 an hour, 10 hours a day, 7 days a week. This continued over a period of 2 weeks. Every available doctor and nurse was enlisted to assist. 20 or 30 doctors gave freely and voluntarily from 3 to 5 hours daily to the bleeding of these donors, many of them coming direct from their aid stations where they had been on duty all night. Every doctor who did not have any other definite assignment was enlisted to help, and on one shift the same 10 doctors reported day after day. By 11 o'clock on December 7th the blood bank had taken over most of the operating room and all of the laboratory at The Queen's Hospital.

Men and women waited in line for hours. Soldiers stood their guns with fixed bayonets in the surgery hallway and rolled up their sleeves and helped; sailors gave their few precious hours of liberty to wait their turn. Mothers asked strangers to hold their small children and took their turns on the surgery tables. Civilian defense workers from Pearl Harbor, and workers from Red Hill, red eyed from long hours of welding, stopped by to donate before snatching a few hours rest. The whole crew and passengers from a Dutch ship came in a body to help their American allies, then hastened back to their boat to journey across a perilous sea.

A crew of husky iron workers in their oily work clothes came en masse; whole crews from dry docks and inter-island steamships; the dock workers and society folks waiting in line side by side to do their part. Sugar and pineapple plantation employees came direct from their work in the fields.

"I'm 22 years old" was the obvious lie from a girl who looked 14. "Two more" called a nurse, and a boy and girl, both blind, stepped forward. Even expectant mothers were waiting and dejectedly stepped out of line when the doctors announced their blood could not be taken.

The question most commonly asked was "How soon can I come again?"

All week more donors poured in than could be handled each day. With 12 teams working constantly a maximum of 60 donors an hour was reached but could not be maintained. A speed of 50 an hour was averaged, however, from 7 o'clock in the morning until 5 o'clock in the evening, with the workers lunching when they could so that schedules could be maintained.

The original blood bank laboratory was placed on 24 hour duty, the personnel working in three eight hour shifts when necessary doing whatever was needed—sterilizing equipment, preparing sodium citrate, culturing plasma, and so on.

The laboratory at The Queen's Hospital typed the donors, ran serological tests on the blood, prepared plasma and dispensed blood and plasma. Units for preparing plasma and sterilizing equipment were instituted at the Experiment Stations of the Hawaiian Sugar Planters' Association and the Pineapple Producers' Cooperative Association. Equipment and technical assistance were borrowed from the University of Hawaii.

Leahi Home, Kapiolani Maternity and Gynecological Hospital, St. Francis Hospital, Kaumakeolani Children's Hospital and Japanese Hospital absorbed part of the load of plasma preparation with equipment provided by the Public Health Committee. The laboratory at The Clinic under the direction of Dr. Eric A. Fennel cooperated both in drawing blood and making plasma.

More than three weeks have passed since Oahu was attacked and those first terrifying days have passed. The hectic activity has subsided into more or less routine procedure.

With more than 10 times as much plasma on hand as was available December 7, the blood bank, now operating under the Office of Civilian Defense, will continue to function for an indefinite period. The central bank at The Queen's Hospital, with only 20 donors a day, has just passed the almost unbelievable mark of 5,000 donors. Future volunteers are being urged to go to their nearest hospital instead of only the Queen's Hospital.

This work will continue as long as the United States is at war and it is our earnest wish that in time to come the thousands of donors will remember the slogan of the blood bank—for peace time as well as war, "Be a blood donor and save a life."

FORREST J. PINKERTON, M.D., Director

BLOOD PLASMA PREPARATION AND ADMINISTRATION

A MANUAL FOR TECHNOLOGISTS

The Technical Advisory Committee to the Honolulu Blood and Plasma Bank, composed of Drs. Fennel, Witlin and Hirsch, has devised the following technique for the preparation of blood plasma. This has been simplified as much as possible and is offered as a guide. It may be modified by individual technicians to suit their own local conditions. The committee stresses above all the absolute necessity of the strictest aseptic precautions in every step. Only in this way can the percentage of contamination be kept at a satisfactorily low level.

EQUIPMENT

All equipment used should be prepared as for intravenous use. *Bleeding Bottles.* Use any hard glass bottle, chemically clean, 500 cc. to 1,000 cc. capacity. Baxter bottles with standard rubber stoppers are recommended. A triple perforated rubber stopper for the closure should include one short glass tube, stuffed with non-absorbent cotton, as an air filter; one ⅜″ glass tube as an inlet for the blood and one ⅜″ glass tube covered with a red Army vaccine stopper for drawing off the plasma. To the blood inlet tube attach rubber tubing 4″ long, at the end of which a 3″ length of glass tubing (as an observation tube) is attached. To the open end of this glass tube connect an 8″ piece of rubber tubing to which a glass needle adapter and a 16 gauge 2″ needle has been attached.

Attach to the air filter tube 12 inches of rubber tubing. The open end may be a glass or plastic tip for mouth suction or an adapter for the application of a rubber bulb to obtain suction. Suction machines usually produce such a vacuum that the red cells may be hemolyzed as they hit the bottom of the bleeding bottle with the increased force.

Accessories. A test tube with a pledget of cotton at the bottom is used as a cover for the needle. A cotton stopper aseptically closes the needle and adapter within the test tube.

Two cork stoppered, chemically clean, and, preferably sterile, Wassermann tubes, one for serology, and the other containing 5 cc. of normal saline solution, for blood typing.

Wooden clothespins of the spring or clamp type; or pinch clamps.

PREPARATION OF APPARATUS

(1) In the bleeding bottle are placed 100 cc. of a freshly prepared, filtered 2% sodium citrate with 2 molecules of water, ($Na_3C_6H_5O_7 2H_2O$) or 100 cc. of a 3.2% solution of sodium citrate, with 5½ molecules of water, ($Na_3C_6H_5O_7 \cdot 5\frac{1}{2}H_2O$). Wrap all openings of the unit with heavy wrapping paper to produce an extra margin of safety. If desired, place these units in heavy muslin bag closed with rubberbands. Sterilize in an autoclave; at 15-pound pressure for 20 minutes, or at 12-pound pressure for 30 minutes. Raise and lower the pressure and temperature slowly to prevent cracking of the glass containers. Set stoppers loosely to prevent breakage from heat.

(2) Wash apparatus with soap and water, boil in 1:10,000 sodium hydroxide solution, rinse thoroughly with tap water, and finally rinse with distilled water.

The above method or one equally suitable is mandatory.

METHOD OF DRAWING BLOOD

Employ as aseptic procedure as possible, such as a thoroughly clean room, and the wearing of caps, masks and sterile gowns by the operator.

A tourniquet is applied. The site of bleeding is prepared with tincture of iodine washed with alcohol, or by brisk rubbing with acetone, ether, or benzine followed by alcohol. The alcohol is allowed to evaporate, and the needle is inserted into the vein. Not over 500 cc. of blood is withdrawn, the bleeding bottle continually swirled by an aide. With the assistance of several aides, one doctor can bleed several donors simultaneously. Suction may be applied by mouth or by aspirating with the barometer bulb. The patient is instructed to alternately open and close the hand to a tight fist, slowly and uniformly.

When the bleeding is completed, the tourniquet is released and the 4″ rubber tubing affixed to the bottle is kinked and clamped. The patient is instructed to open his hand and the needle is removed. A pad of sterile cotton, or preferably a pad of cotton wrapped in gauze, previously saturated with a 1:1000 mercuric bichloride solution, is applied to the site of the venipuncture and the patient's hand brought to the shoulder so as to form a compress at the site.

The needle is placed into the serology tube and the observation tube removed, thus allowing the blood in the tube attached to the needle to

run into the Wassermann tube. A drop of blood is milked or squeezed from this tube into another Wassermann tube containing normal saline for blood typing.

The rubber tubing attached to the air filter tube is removed. The bottle of citrated blood and the Wassermann tubes are properly labeled. The serology and blood typing tubes are sent to the laboratory. The blood bottle is placed into a 4° C. refrigerator and held until a negative serology report is obtained. One of the rapid flocculation tests such as the Kline exclusion test is recommended for speed. Doubtful tests can be checked by longer methods.

METHOD OF SEPARATION OF PLASMA FROM CELLS

Immediately after bleeding, if the time factor is urgent, centrifuge the blood in a sterile 250 cc. centrifuge bottle, preferably at a temperature of 2 to 4° C to obtain immediate separation of the plasma from the cellular elements.

Special apparatus may be improvised to perform this procedure under a closed system if time is not an important factor and if there is plenty of icebox space. In this case the citrated blood is placed in a refrigerator at a temperature of 2 to 4° C for five days to settle.

The plasma is now ready to be removed aseptically to a large sterile flask for pooling. The plasma from 50 bleedings is to be preferred. The plasma is withdrawn by removing the stopper from the third glass tube of the bleeding bottle and introducing a sterile glass pipette attached to the suction apparatus and pooling flasks. The pooling of a large number of bleedings is carried out to obviate the necessity of typing the plasma.

Typing is practiced in case the whole blood is used for tranfusions. Typing of plasma is unnecessary because the agglutinin titer of pooled plasma is extremely low, and because no erythrocytes are present to be agglutinated by the potentially incompatible serum of the recipient.

STERILITY OF PLASMA

After pooling, 5 cc. of the pooled plasma is removed aseptically and tested for sterility by inoculating 25 cc. of sterile Thioglycollate medium (Brewer's). The inoculated medium is incubated for 7 days at 37.5° C. It is recommended that the medium be tubed to form a column about 7 cm. high.

To the pooled plasma, aqueous merthiolate solution 1:1000 is added aseptically so that the final concentration of the merthiolate will be 1:10,000 in the plasma* (add 25 cc. of 1:1000 merthiolate solution to every 225 cc. of the pooled plasma. The pooled plasma is maintained in the refrigerator at a temperature of 2 to 4° C.

RELEASE OF PLASMA

After 7 days' incubation, the cultures are examined microscopically by removing a loopful to a slide, fixing, and staining by Gram's method.

The sterile plasma is distributed into sterile, rubber stoppered, hard glass or pyrex bottles of 250 cc. capacity by aseptic technique. The bottles are filled to capacity to eliminate air space. One out of every ten bottles is tested for sterility as outlined above.

If the sterility tests are satisfactory and show the plasma to be devoid of bacterial contamination, it may then be released for parenteral administration or stored at 2 to 4° C.

RECOVERY OF CONTAMINATED PLASMA

(a) Cotton filtration

(b) Berkefeld filtration after preliminary high-speed centrifugalization

(c) Sterility testing

(d) Animal-inoculation testing for toxins and viruses.

If you have not the facilities or the technical assistance, please advise us. We may be able to help you through the Central Bank laboratory.

TECHNIQUE FOR ADMINISTRATION OF PLASMA TO PATIENT

Plasma is more viscid than whole blood or normal saline. It plugs the needle unless dilutions with normal saline are used and *it must be filtered before using!*

(1) Plasma is given with an ordinary intravenous set containing a 16 or 18 gauge needle to enter the vein; 3 to 4 feet of tubing with or without filter, and a 300 cc. burette or a modified tube to hold the solution.

(2) Pour into the burette the proper amount of *warm normal saline* (37° C) to make the right dilution, empty air bubbles and enter the vein. *Do not use Ringer's Lactate as diluting fluid.*

(3) Put funnel and filter in the burette, after removing sterile cover of paper on gauze.

*We believe merthiolate solution in 1:10,000 concentration does not act as a bactericide, but merely as a bacteriostatic agent.

(4) Pour the warmed plasma slowly into container through the gauze filter. Some sets will have stainless steel filters and in such cases no gauze covered funnel is required.

(5) Remember collapsed veins may become usable veins after circulation has been reestablished. Needles should be carefully inserted and strapped into place to save repeated punctures.

(6) Venesection sets are available and are to be used if veins cannot otherwise be picked up. The intravenous cannulas are to be sutured into the skin with silk. Acquaint yourself with the technique of tying a blunt needle or cannula into a vein!

A. An empty unit complete ready for use.

B. Photograph A stripped of the accessories and ready for refrigeration. Note that two test tubes have been removed for serological study and blood typing.

C. Muslin bag for convenience of handling in storing the sterilized units until ready to be used at the bedside.

D. Two-hole unit which requires the introduction of a pipette for the drawing off of plasma through one of the openings. One opening contains cotton to prevent a possible aspiration of debris if the operator uses the mouth suctioning technic. The other hole, on which the clothespin is attached oftentimes contains a remaining clot of blood through which the aspirating needle must be passed when drawing off the supernatant plasma. For that reason the three-hole stopper is more convenient by simply removing the army vaccine red stopper from the third tube inserting the pipette for drawing off the plasma.

PHYSICIAN ASSIGNMENTS BY HOSPITALS DURING EMERGENCY

as set up by

Emergency Medical and Ambulance Service, Office of Civilian Defense, Oahu.

	Staff	*Assigned*	*Burn Team*	*Gas Casualty Supervisor*
CHILDREN'S HOSPITAL		Alsup, F. Alsup, W. E. Hayes Hollmann Howarth Ing, H. Y. Lee, R. H.	Fujiwara Yee, Sam	Marshall
CITY & COUNTY EMERGENCY HOSPITAL	Chun, R. Katsuki, D. Luke, L. Mossman Tyau Yap, R.	Cooper, J. Culpepper Kometani Chun, R. Yap, R.		
JAPANESE HOSPITAL	Akita, Matsuyoshi Takenaka	Bowles Batten Katsuki, S. Kohatsu Kuninobu Nishijima Ogawa Schnack Straub Takahashi Uchida Uchiyama Yamane	Sakimoto Uyeno	Okazaki,
KAMEHAMEHA HOSPITAL	Irwin, Fred	Hill Holmes Irwin, P. Mitchell Schnack Sato, Zen	Black	Gordon
KAPIOLANI HOSPITAL		Milnor Putman Schattenburg	Phillips	
LEAHI HOME	Childs Leslie Nojima Perlstein Radner Walker		Childs	Radner
QUEEN'S HOSPITAL	Bailey Buzaid Casey Hartwell Hirsch Ito Sexton Slaten	Judd Chang, W. K. Hosoi Inouye Kaneshiro Lam, F. Ohta Sia Strode Yamamoto	Bell Childs, L. Doolittle Hamre Hume Molyneux	Hartwell
SHRINERS' HOSPITAL		Craig Farrell Yamashiro, M. Yamashiro, Yamauchi	Chock Pang, H. Q.	Pang, H. Q.
ST. FRANCIS HOSPITAL	Wipperman	Gaspar Benz Ing, E. Kawano Kim Li, M. H. Moffat Morong Ohtani Schnack Seto Van Poole Wynn	Wipperman Richert	Austin
ST. LOUIS		Brown Hodgins McVeagh Holmes Osorio Smith Winter	Burgess Cushnie	Gotshalk
TERRITORIAL HOSPITAL	Stephens, E. Cooper, H. B. Kepner Natsui Ozawa			
TRIPLER HOSPITAL		Halford		
MOBILE SURGICAL TEAM		Chung, M. F. Cloward Pang, L. Q. Spencer		
Blood Bank		Devereux. Fennel Pinkerton Tilden		

KAUAI

At the outbreak of the war Kauai was half-heartedly organized as to first air emergency units. However, immediately after the declaration of war, the doctors and nurses became active and today Kauai has well organized, functioning units, able to take care of the medical needs in case of large numbers of casualties.

Dr. V. A. Harl was selected as medical coordinator for Kauai, Dr. A. Webster Boyden in charge of personnel, Dr. J. M. Kuhns for Medical Intelligence, Dr. Marvin A. Brennecke as Supply Officer, and Dr. S. R. Wallis for Plans and Training. Miss Mabel Wilcox is coordinator of nursing service and has been working in close cooperation with the doctors in organizing and nursing work and coordinating it with the medical set-up.

There are first aid emergency units at:

Kekaha	Dr. Kenneth Amlin
Eleele	Dr. David Betsui
Koloa	Dr. A. H. Waterhouse
Lihue	Dr. Y. P. Chang
Kapaa	Dr. Isami Umaki
Kilauea	Dr. V. A. Harl

Dr. Kenneth Amlin has been assigned to Waimea Hospital, Dr. Honl to Eleele Hospital, Dr. Brennecke to Koloa Hospital and Dr. V. A. Harl to Kilauea Hospital. All other available doctors will be used at the Wilcox Memorial Hospital in case of emergency.

At the outset of the war Dr. Marvin A. Brennecke, in charge of supplies, immediately "froze" all medical supplies on the Island and set up a medical supply depot at the Lihue Grammar School, which has been functioning since this time and will continue to function until the emergency is over.

All the first air stations have been supplied and equipped through this central medical supply depot; since its organization by Dr. Brennecke it has been operated by Mrs. Marvin A. Brennecke, R. N., who will now continue as supply officer, relieving Dr. Brennecke for professional duties.

Dr. J. M. Kuhns, medical intelligence officer, has set up an organization which can at any moment give him an exact picture of the medical requirements of every section of the Island, enabling him to give medical aid to those areas needing it, using medical personnel and supplies from the areas not affected.

The nurses are splendidly organized under the supervision of Miss Mabel Wilcox. The nurses active at the present time have all been assigned to duties in case of a disaster, and those nurses who are inactive have been given refresher courses and have been assigned to duties in the first aid stations, in the hospital, or wherever they are best suited. The nurses have had charge of training the nurse aides for the first aid units.

The Dental Association is cooperating fully with the Medical Society. A dentist is second in command at every first aid unit, and the dentists have played a very important part in organizing and equipping the ambulances which are assigned to each first aid unit. The dentists are also spending a great deal of time in training the medical aid men.

The securing of blood plasma is playing a large part in Kauai's medical preparedness. The laboratory, under the supervision of Dr. A. M. Ecklund, was preparing between 1000 and 2000 cc. of plasma a week until he was called into the Navy. Since that time, the work is being continued by Mrs. Ecklund.

Sam R. Wallis, M.D.

HAWAII:

As soon as the reports of the attack on Pearl Harbor were confirmed, our physicians were called to their posts and a continuous alert has been maintained since. The Hilo aid station was immediately mobilized and was ready for any demands. The personnel of this station were on duty continuously for five days and frequent practise sessions have since been carried out. The medical preparedness committee had meetings on the 7th and 8th and lent its advice and counsel to the various medical units that were standing by.

Forty-eight hours after the attack on Oahu we first heard of the need for blood. Within a few hours we had 25,000 cc. of blood and plasma ready for shipping and 24 hours later an equal amount. The first batch was sent for the following day but then we were told that the other was not required. If we had been asked or had the means of transportation we could have had a large amount of blood and plasma en route to Oahu soon after the first attack and when it was most needed. We have been active lately in building up a bank of plasma that should serve

if another call is made for it. Difficulties are being encountered in getting donors but this problem must and will be solved. Dr. C. B. Brown and E. Tompkins compose the sub-committee in charge of this work.

The Preparedness Committee has now received from the eight medical aid districts outside of Hilo, complete plans of their hospital and aid station set-ups. The composite picture indicates that we have laid our groundwork well and should soon be ready for anything that may happen. We have found that the local vocational school is a very valuable community project. Upon general ideas being given to them they have within a few hours delivered to us Thomas splints and stretchers worthy of the best craftsmen and at a cost surprisingly low. Large quantities of these are being made and distributed in every district.

For some time ward maids have been in training by the N.Y.A. in connection with the larger hospitals and several of the smaller hospitals have given one or more classes of such young girls intensive training in the hospital wards so that valuable assistance will be at hand if it is needed.

H. M. PATTERSON, M.D.

MAUI:

Dr. McArthur succeeded Dr. Burden as director of the medical department of the Major Disaster Council. Under this department, numerous committees have been formed concerning plasma bank, evacuation hospitals, first-aid units, collecting stations, and supply and control boards, which are yielding excellent results.

The attitude of our entire group, in which every member of the Medical Society has a part, is very optimistic about the entire program with but one exception—*finances*. The County Society feels that some financial solution to the problem should be forthcoming if we are to be influenced by the reports of the Swope-Haralson distributing agencies of federal funds allocated to medical preparedness. We do hope that the JOURNAL may offer some enlightment on this all-important point.

Numerous volunteer workers, the Red Cross and Mr. R. B. Kniffen, executive superintendent of Paia Hospital, have all contributed loyally and graciously to the preparedness effort that is being made on Maui.

In summation, we are indeed pleased with our program and feel that our answer to potential problems will be as good as that of any community this size in the world. But, if our mother chapter in Honolulu will assist us in obtaining federal funds, we will guarantee a performance that is past being representative; actually commendable.

EMORY H. ANDERSON, M.D.

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COUNTY SOCIETY REPORTS

KAUAI COUNTY MEDICAL SOCIETY:

The regular monthly meeting of the Kauai County Medical Society was held at the Wilcox Hospital at 7:30 P.M., Nov. 12, 1941.

Communications were read relating to the Plantation Health Cooperative Plan. Discussion along general lines followed but no action taken.

Transfer card for Dr. Donald Chisholm reported as having been received from the Honolulu County Medical Society. Transfer accepted by unanimous vote.

Recently the secretary has been notified tnat transfer cards have been accepted by the Honolulu Society for Drs. Giles & Richert and one from the Hawaii County Society for Dr. Yoshimura.

The new Constitution & By Laws were read, discussed and adopted. Delegate. The Society approved a motion granting one way minimum first class steamship passage to the place of the annual meeting.

The Secretary-Treasurer was instructed to refund to Dr. Liu dues he had paid to us on acceptance of his transfer.

Motion by Dr. Amlin that President appoint a committee comprised of representatives from each of our hospitals presently authorized to care for indigent patients. Purpose would be to make a general study of our indigent problem and especially to establish a standard rate for all such Hospital Services, on a per diem basis. Considerable discussion followed. Motion was lost.

Because of the meeting having been long, Dr. Chang's paper was deferred for one month.

Meeting adjourned.

WEBSTER BOYDEN, M.D., reporting

MAUI COUNTY MEDICAL SOCIETY

Since November, 1941, no regular meetings of the Maui County Medical Society have been held. In their place, combined meetings with military and civilian defense authorities have taken place each week. Within the near future, a regular society meeting will be called for election of officers.

Since the last minutes have been filed with your office, Dr. Hawley H. Seiler of Paia, Maui and Dr. William B. Patterson of Puunene, Maui have been elected to membership.

Drs. Burden, Murray, Fleming, and Cowan have been called to active duty with the United States Army but their precise locations have not been learned. Drs. K. Izumi and E. H. Anderson have both been notified that they too will be most likely called to active duty within the next few weeks. It is certainly the desire of the Society, and we believe, the hope of the community at large, that the armed service will see fit to station as many men of this group, as is possible, to local duty.

EMORY H. ANDERSON, M.D., reporting.

HAWAII COUNTY MEDICAL SOCIETY:

The 201st monthly meeting of the Hawaii County Medical Society was held December 2nd, 1941, at the Hilo Memorial Hospital. There were 17 members and 3 guests present.

The important business of the evening consisted of instructing our Councillor, Dr. S. R. Brown, on the Society's wishes regarding (1) Plantation Medical Plan in which we had already gone on record so that no further action was necessary; (2) Territorial-wide Post-Graduate Policy. There was a discussion as to a $10.00 assessment fee per member per year to defray the cost of this policy. A motion was made and passed that our Councillor be instructed that we are in favor of such a policy; (3) the Library Policy. The matter of $2.00 assessment per member per year was discussed and it was thought that our Councillor knows that we are in a receptive mood for such a policy. It was thought that the Maui Medical Society's suggestion of a medical index on each island was a very worthy one and should receive further consideration.

The coming visit of Dr. Moorhead was discussed and a program and itinerary arranged.

The Censorship Committee submitted the application for membership to the Society of Dr. O. K. Tofukuji who was a transfer from the Maui Medical Society. The application was unanimously approved by the Society for membership.

The scientific paper for the evening was given by Dr. A. I. Shimamura on "Hypofunction of the Ovary." He presented a very able discussion on the embryology, histology and pathology causing the condition. Symptoms and signs were discussed by Dr. Shimamura, followed by a comprehensive discussion of treatment with several case reports demonstrating favorable and unfavorable outcomes. Meeting was adjourned at 9:30 P.M.

The 200th monthly meeting of the Hawaii County Medical Society was called to order at 7:45 p.m. at Hilo Memorial Hospital. There were 26 members and 3 guests present.

Dr. Carter reported a case of enchondroma of the middle finger of the right hand in a young man who had received a previous injury to this part. An amputation of the finger was done and to date the result has been very favorable. Dr. Carter also reported a case of suspected B. coli septicemia in a young Hawaiian woman. Widal and stool examinations were negative; but blood culture revealed a few colonies of the B. coli which led to the diagnosis. The patient was treated with sulfathiazole and made a very rapid and uneventful recovery.

The committee on forms of medical practice reported that there has been a new form of plan now offered which was presented the same day to a meeting of the plantation physicians. The committee did not wish to make any recommendations until the plantation physicians had approved or disapproved it. As few men, other than the plantation physicians, knew anything of the new plan, it was read. Briefly it is a plan underwritten by the H.M.S.A. and similiar to the plan now operating in Honolulu. Dr. Patterson reported that the plantation physicians had passed a resolution in regard to this plan which he read and briefly gave their objections to the plan as offered at this time. The main feeling was that the plan was incomplete and would require a great deal more work to straighten out details. It was voted that the committee of the Society continue their work and act as liaison between the plantation physicians and the Society, keeping the Society better informed of developments. An amendment to this motion was added that the secretary write to the Territorial Medical Association requesting them to keep us fully informed on all new developments so that we may be better informed when called upon to act. Motion and amendment were unanimously passed.

Dr. Arimizu reported regarding his study of venereal disease control in Hilo that the plan in operation in Honolulu is not adaptable to Hilo because the Board of Health refused to cooperate in enforcing control, since in so doing it would put its stamp of approval upon prostitution which is illegal. He explained that in Honolulu this is carried by the Palama Settlement, a disinterested party, and thus it does not become involved under the territorial or county laws. Captain Mayfield was asked to work with Dr. Arimizu to try to set up some workable plan for control in Hilo.

Dr. Keay read the minutes of two of their recent meetings of the Preparedness Committee which were placed on file.

Transfer of membership for Dr. Kaname Yoshimura was voted upon after having first passed the Board of Censors. The Society voted to accept Dr. Yoshimura into membership of the Hawaii County Medical Society. A transfer from Maui County was received on Dr. Tofukuji and an application for membership from Dr. Mitamura. These were referred to the Censorship Committee for their action.

EDMUND TOMPKINS, M.D., reporting

January 12, 1942

Recent Activities of the Hawaii County Medical Society.

The principal activity of the medical profession on the Island of Hawaii since November has been concerned with getting prepared for the war which came on December 7, 1941. Since then we have been methodically doing what we feel is essential to care for whatever the emergency may bring to this Island. Since April 1941 careful plans have been made to meet the emergency which we hoped would not come. In these plans every member of our Society has come forward willingly and has done well the tasks assigned to him. Never in his experience has this reporter seen a group of about forty physicians working in closer harmony with less evidence of friction than throughout this effort; and since December 7, the medical attitude has been "give me a job and I will do it."

One of our colleagues Dr. S. R. Brown, was in Honolulu for a council meeting when the stab in the back was made. He worked with Dr. Moorhead at Tripler Hospital for the first several

days and upon his return a special meeting was called so that the experience gained by him could be shared with us. His outline of what was done and what is suggested for the future treatment of war casualties is being digested by all of us and should war casualties occur on this Island, we will have gained much by the disaster that befell Oahu.

Dr. L. L. Sexton visited Honolulu on the week-end of January 10th and attended meetings at which the future plans for the treatment of war casualties were discussed. He is to outline the recommendations made at a meeting of our society on Jan. 15th.

The January issue of the Journal was assigned to this Island and in spite of numerous handicaps four manuscripts and a editorial were in the mails on December 17th. Due to the fact that the Journal has been delayed and by this time material essential to us all has been prepared by those who handled casualties on Oahu we have gladly instructed the editor to defer publication of any or all of our papers until a later issue.

H. M. Patterson, M. D., reporting

HONOLULU COUNTY MEDICAL SOCIETY

Summary of Activities since October 24, 1941.

In addition to the regular meetings of the Board of Governors and the general assembly of the society, there have been many special meetings of the Board of Governors and of the various committees since the last report. A formal recapitulation of these meetings does not seem to be in order at this time but rather a few facts preserved for the permanent record, because December 7, 1941 marked a definite change in the activities of this Society and its members. When all the "hush-hush" is over perhaps the true story of December 7 will be written. In the meantime suffice it to say that every society member placed himself immediately available for the job assigned to him. The Board of Governors has gone on record that exploitation of individual names is not to be tolerated and that appetites should be curbed for personal publicity.

The fiscal year for the county society starts May 1st of each year and before the beginning of this fiscal year the Medical Preparedness Committee of the Honolulu County Medical Society was functioning with 20 first aid units in 20 different locations in this city actively in training. In addition to these 20 first aid units, all adequately manned, there were medical and surgical teams set up by the society to act in the event of what was euphemistically called "any disaster." Furthermore the medical society had sponsored a championship benefit baseball game, the net proceeds of which were several thousand dollars intended to finance the equipment of first aid units.

When the kick-off came at 7:55 on the morning of December 7 the medical society was assembling for a lecture by Dr. John Moorhead who had been brought from New York at the expense of the Medical Society to give lectures on traumatic surgery. Over the radio the first calls were to assemble policemen and firemen off duty and medical society members to go to their first aid stations and also to the various hospitals. By name individual members of surgical teams were directed to report at once to Tripler General Hospital and most of the surgical teams worked throughout 24 hours. Among the men who volunteered was Dr. Moorhead who since that time has been on active duty as a member of the Medical Reserve Corps of the U. S. Army.

It cannot be emphasized too strongly that every member of the County Medical Society, regardless of racial extraction, nationality, sex or age responded immediately to the call of the authorities and continued on duty with an unselfish disregard for his own safety, health and economic status for the entire period of the emergency.

The 30 or more doctors who for weeks spent many hours each day in building up the civilian blood bank which was drawn upon by the armed forces cannot be too highly commended. Much of the work and many of the hours put in by members of the Honolulu County Medical Society was routine, unpleasant, tedious work. At the time of assignment these routine jobs might have turned out to be the most important ones. Actually there were no individual heroes.

Other organizations more experienced in obtaining publicity have obtained world-wide mention because of their activities whether they were or were not prepared. The Honolulu County Medical Society was prepared and took the job in its stride.

In addition to the emergency work there was the item of the examinations of some 4500 draftees which was carried out entirely by members of the Society early in January.

So much for the work since December 7th. For months prior to December 7th the Medical

Society had been on record asking for hospital expansion, and an adequate blood bank, and was sponsoring first aid stations and training first aid workers.

At the regular membership meeting November 7th a resolution was passed congratulating Dr. and Mrs. James T. Wayson on the occasion of Dr. Wayson's 50th year of practice of medicine. At a later meeting Dr. Moorhead was presented with a plaque commemorating his visit in Honolulu.

The gift of an electric refrigerator by Mrs. James T. Wayson and a donation from Dr. Moorhead to the library fund were acknowledged.

Gasoline rationing which has been drastically reduced is still a moot point.

New members admitted to the Society: Dr. George F. Ellinger was accepted as a service member; Dr. Louis Hirsch and Dr. L. L. Buzaid as honorary members; Drs. Kenneth Fujii, Willis Hume, T. F. Fujiwara, Norman Sloan, Ted Allen Casey, G. Wipperman were accepted into regular membership.

A. W. DURYEA, M.D., reporting.

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NOTES AND NEWS

REPORT OF COUNCIL MEETING HAWAII TERRITORIAL MEDICAL ASSN.

December 4, 1941

The principal business of the meeting was to consider the plantation health plan. The councillors from all islands agreed that if a plan was to be adopted for plantation employees it should be uniform as to fee schedule and acceptable to the Territorial Association. The following resolution was adopted:

> "WHEREAS, the plan as suggested (this refers to the first plan proposed by the HSPA) involves features which would impair the quality of medical care and cause a deterioration of professional standards in the Territory, Therefore
> BE IT RESOLVED that the Council of the Hawaii Territorial Medical Association hereby expresses its disapproval of this plan but expresses a willingness to stand ready to work out a plan which would not contain objectionable features."

It was voted that the Association proceed with a definite extension of the H.M.S.A. plan to the other islands and that a representative of this Council go before the Managers' meeting of the H.S.P.A. to explain the plan and what the Council hoped to do.

A territorial-wide post graduate policy was discussed. Decision was deferred and the matter is to be brought up at the annual meeting.

Extension of services of the Honolulu County Society's medical library to the outside islands and participation by the islands in the expenses of the library on the basis of yearly assessment was considered. No definite decision was arrived at. Action deferred until the annual meeting on the matter of an appropriation from the Territorial Association to the library as called for in the by-laws.

The Council approved the recommendation of the Psychiatric Committee, as follows:

"We respectfully recommend to the Council of the Hawaii Territorial Medical Association as a commendable project, the formation of a mental hygiene society for this community. We recommend that the Association lend its support and assistance to a general plan such as recommended by the National Committee for Mental Hygiene for State Societies. R. D. Kepner, M.D., Chairman."

R. O. Brown, M.D., Secy.

NEW MEMBERS

Hawley H. Seiler—Paia, Maui
Wm. B. Patterson—Puunene, Maui
Kaname Yoshimura—Hawaii (by transfer)
O. K. Tofukuji—Hawaii (transfer from Maui)
Donald Chisholm—Kauai (transfer from Honolulu)
Geo. F. Ellinger—service member
K. Kenneth Fujii—Creighton, 1936.
Louis Hirsch—honorary member
Willis F. Hume—Harvard, 1932.
T. F. Fujiwara—Tulane, 1936.
Norman Sloan—University of Pa., 1927.
T. Alan Casey—University of Colorado, 1939.
G. Wipperman—(transfer)
L. I. Buzaid—honorary member

HAWAII DOCTORS CALLED TO MILITARY DUTY

Edmond V. Avakian, Alfred J. Burden, Hong Chong Chang, Edwin K. Chung Hoon, Archie Chun-Ming, Thomas W. Cowan H. M. Chandler, D. S. Depp, A. Ecklund, Robert B. Faus, James R. Fleming, Clarence E. Fronk, Isaac Kawasaki, Joseph F. C. Lau, Walter T. Macklin, R. J. Mansfield, R. J. Mermod, R. Millard, Douglas H. Murray, John W. McClellan, J. Palma, David L. Pang, Carl F. Tessmer, F. W. Thompson, Fook Hing Tong, C. W. Trexler, Arthur L. Vasconcellos, Arnold Wagner, G. E. Wall, R. West, Paul O. Wiig, Charles L. Wilbar, Paul Withington, B. O. Wade, James F. Wong.

A kamaaina gathering of 300 physicians, their wives and their friends, honored Dr. James T. Wayson and Mrs. Wayson on the occasion of their 50th anniversary in medical practice. The reception took place in the Mabel Smyth Building on Tuesday, November 10, 1941. Dr. Wayson came to Hawaii in November 1894. He joined the staff of the Kalihi receiving station in 1895. He served on the territorial health board and for seven years was city and county physician. He is now physician for the Board of Hospitals and Settlement. In his long career of public service, Dr. Wayson has made important contributions to the study, treatment and eradication of leprosy.

Dr. Thomas F. Fujiwara has opened offices at 22 S. Vineyard St.

Dr. W. Fulton Hume has recently joined the Medical Group specializing in surgery.

DR. HARRY ARNOLD, JR. who left Honolulu December 4th by Clipper was finally able to return through an order of the War Department authorizing the Army transport service to bring home any stranded Honolulu doctors. He arrived the middle of January. While on the mainland he took and passed the American Board of Dermatology and Syphilology examinations.

DR. ALFRED S. HARTWELL arrived the latter part of December to take up duties as medical resident at Queen's Hospital, coming from Massachusetts General Hospital.

DR. DOUGLAS MURRAY was ordered over from Maui into active service and is stationed at the Kaneohe Hospital.

DR. JAMES F. FLEMING of Paia, Maui has also been called to Honolulu on active duty and is stationed at the Japanese Hospital.

DR. ERNESTINE KANDEL HAMRE has been appointed by the Hawaii Chapter, American Red Cross as the physician member to its First Aid Committee.

DR. KEPNER'S paper "Evaluation of Metrazol Therapy of the Psychoses" read before the Honolulu County Medical Society in August of last year (and abstracted in the initial issue of this Journal), appears in full in the December 3, 1941, issue of The Medical Record, Vol. 154, No. 11.

The Territorial Medical Board Examinations were held January 12-15 with the following doctors taking the boards: DR. F. WARSHAUER, DR. GEO. H. Y. CHING, DR. CLARENCE F. CHANG, DR. EDWIN P. K. KAM, DR. FRANCIS R. KANESHIRO and DR. S. INAMINE.

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A.M.A. MEETING

The Annual Meeting of the American Medical Association will be held at Atlantic City, N.J., June 8-12, 1942. Our delegate and alternate, appointed last year to serve for two years, are F. J. Pinkerton and Lyle G. Phillips, respectively.

The Hawaii County Society which was to have been responsible for this issue of the JOURNAL kindly permitted it to be devoted instead to the experiences gained and observations made on and after December 7th.

The March issue, therefore, will be assigned to the Hawaii County, the May issue to Maui and the July issue to Kauai—international affairs permitting.

PLANTATION HEALTH PLAN

No further progress has been made regarding the plantation health plan for employees earning over $100. per month because of the outbreak of the war which immediately followed the Council meeting. Mr. Bowman of the H.M.S.A. has returned meanwhile and will work with the Physicians' Association on Oahu and with the H.S.P.A. in an attempt to formulate an acceptable plan. The outside islands will be kept posted as to progress made.

LEPROSY IN HAWAII

Owing to Dr. Chung Hoon's call to active duty, the column entitled "Leprosy in Hawaii" does not appear in this issue. We hope to be able to resume it soon under either his authorship or someone's else.

IN MEMORIAM

GEORGE CLINTON POTTER, long time resident of Hawaii and for 26 years superintendent of the Queen's hospital, from which position he retired five years ago to make his home on Maui, died on January 26, 1942 in Queen's Hospital. He had been ill for several weeks.

Mr. Potter was born in Oakland, California, August 30, 1862, and came to Hawaii in 1880.

LIBRARY NOTES

The Medical Library of the Honolulu County Medical Society is undergoing complete reclassification. The Dewey decimal system, widely used by general libraries, has long been considered unsuited for specialized material to be found in a medical library. Instead, the medical classification originated by the Boston Medical Library, and later adopted as a standard by the American Medical Library Association, is being used.

Each book in our collection is being given careful consideration to determine whether it is suitable for our library. Many old and useless books are being weeded out in the process, while on the other hand many rare and valuable books have been discovered. These are being placed in a special rare and historic book collection and articles on them will appear from time to time in this column.

All books are being given a fresh coat of shellac, mended where necessary, and sprayed against silver fish and termites.

A fine collection of nursing books was recently purchased by the Nurses' Association and is now classified and housed in its own alcove ready for circulation.

Books to be replaced by later editions or found to be unsuited to the needs of the Library, will be offered free to doctors interested in acquiring them for their private collection. Some may be of historic interest to the men specializing in one field of medicine.

Present activities should be completed within six months at which time our Library will be ready for long term planning to make it an adequate reference library and secure the great number of current publications necessary to keep the physicians of Hawaii abreast of the rapid advancement of all medicine.

Much of the above progress has been made possible through the planning of Mrs. Shanahan, a trained librarian, who, together with Dr. Shanahan, Asst. Psychiatrist at the Mental Health Clinic, have given many evenings to appraising and sorting our collection.

The committee welcomes any suggestions for book purchase, donations of recent titles, back numbers of journals, or ideas for improving the service.

A. W. DURYEA, M. D.
Chairman Library Committee

LIBRARY GIFTS

The committee wishes to thank Dr. Ralph Cloward for his gift of books entitled CLINICAL EXAMINATION OF NERVOUS SYSTEM by Monrad-Krohn and INTRACRANIAL TUMORS by Bailey.

Dr. M. A. Blankenhorn presented the library with a three volume set of MODERN MEDICAL THERAPY IN GENERAL PRACTICE, edited by David Preswick Barr. Volume I contains General Therapy—methods used in therapy; Volume II contains General Diseases—infectious diseases, diseases of the nervous system, and Volume III contains Diseases of the Digestive System, diseases of other organs and systems.

Dr. Ernestine Kandel Hamre donated the two volumes of Dr. Fred L. Adair's OBSTETRICS AND GYNECOLOGY.

Dr. Max Cutler sent the library a copy of CANCER, ITS DIAGNOSIS AND TREATMENT, written by himself and Dr. Buschke.

Dr. John J. Moorhead on the eve of his departure made a generous donation to the Library Fund for the purchase of new books.

The Territorial Nurses' Association recently purchased some 60 books for the nurses' section of the library. Some of these may be of interest to the doctors, viz:

Diagnosis and Treatment of Skin Diseases—Swartz
Newer Knowledge of Nutrition—McCollum
Foundations of Nutrition—Rose
Textbook of Psychiatry—Noyes
Hospital Organization and Management—McEachern
Preoperative and Postoperative Treatment—Mason
Materia Medica, Pharmacology, Therapeutics—Muse
Diagnosis and Treatment of Pulmonary Tuberculosis—Hawes
Medical and Surgical Asepsis—Henderson

JOURNALS ON FILE

Abstracts of Bacteriology:	1921-1925
American Heart Journal:	1930-1931
American Journal of Cancer:	1931-1940
American J. of Clin. Path.:	1931-1936
Am. J. of Diseas. of Children:	1920-1940
American J. Med. Science:	1883-1940
American J. of Obst.:	1917-1919
Am. J. of Obst. & Gyn.:	1920-1940
American J. of Ophth.:	1919-1932
American J. of Path.:	1935-1937
American J. of Psychiatry:	1922-1933
American J. of Roent.:	1920-1932
American J. of Surgery:	1934-1940
American J. of Syphilis:	1934-1935
American J. of Trop. Med.:	1932-1938
Am. J. of Syph, Gon. & V.D.:	1936-1940
Am. Rev. of Tuberculosis:	1925-1940
Annals of Internal Medicine:	1937-1938
Ann. of Oto., Rhin., Laryn:	1904-1940
Annals of Ophthalmology:	1904-1912
Annals of Surgery:	1904-1940
Archives of Derm. & Syphil.:	1922-1940
Archives of Intern. Medicine:	1918-1931
Archives of Neurol. & Psych.:	1922-1940
Archives of Ophthalmology:	1926-1936
Archives of Otolaryn.:	1925-1934
Archives of Surgery:	1920-1932
Ars medici:	1932-1935
Boston Med. & Surg. J.:	1923-1926
British J. of Ophth.	1922-1930
British Med. Journal:	1934-1940
Calcutta Med. Journal	1936-1939
Canadian Med. A. Journal:	1934-1940
Chinese Medical Journal:	1932-1936
Clinical Med. & Surg.:	1935-1940
Current Medical Digest:	1934-1940
Digest of Treatment:	1938-1940
Endocrinology:	1934-1940
Illinois Medical Journal:	1932-1940
International Clinics	Vol. I-IV
International Med. Digest:	1920-1940
Japanese J. of Exp. Med.:	1929-1934
Journal of Allergy:	1930-1935
J. of Am. Dietetic Assn.:	1937-1940
J. of Am. Med. Assn.:	1894-1940
J. of Bacteriology:	1920-1933
J. of Experimental Med.:	1935-1940
J. of Immunology:	1923-1938
J. of Lab. & Clin. Med.:	1921-1938
J. Med. Soc. of New Jersey:	1932-1940
J. of Oph., Oto., Laryn.:	1903
J. of Pediatrics:	1937-1938
J. of Pharm. & Exp. Ther.	1934-1935
J. of Social Hygiene	1932-1938
J. of Urology:	1934-1940
Lancet:	1852-1940
Laryngoscope:	1914-1937
Med. Clin. of N.A.	1918-1940
Medical Life:	1934-1937
Mental Hygiene:	1936-1940
Military Surgeon	1936-1939
Natn'l & Med. J. of China:	1930-1932
New England J. of Med.:	1929-1940
Ophthalmic Record:	1914-1917
Otol. Lar. Rhin. Ophth.	1937-1940
Pa. Medical Journal:	1929-1933
Post Graduate Med. Journal:	1934-1935
Quarterly Rev. of Sea View Hosp.:	1940
Radiog. & Clin. Photog.:	1931-1933
Radiology:	1913-1932
Rhode Island Med. Journal:	1930-1938
Science:	1924-1926
Surgery:	1937-1940
Surg. Gyn. & Obst.:	1910-1940
Surg. Clinics of N.A.:	1921-1940
U.S. Naval Med. Bulletin:	1933-1938
Urologic & Cutaneous Rev.	1929-1939
Venereal Disease Inform:	1924-1940

NOTE: These are not by any means complete for the years indicated, but we are rapidly filling the gaps.

JOURNALS SUBSCRIBED CURRENTLY

Annals of Oto. Laryn. & Rhin.
American Dietetics Journal
American Journal of Cancer
Journal A. M. A.
Archives of Dermatology and Syphilology
Archives of Neurology & Psychiatry
American Jr. of Diseases of Children
American Jr. of Medical Sciences
American Jr. of Syphilis, Gonorrhea & Venereal Diseases
Surgery
American Jr. of Obstetrics & Gynecology
American Jr. of Surgery
Annals of Surgery
British Medical Journal
Canadian Medical Journal
Clinical Medicine & Surgery
Journal of Experimental Medicine
Journal of Urology
Lancet
Surgical Clinics of North America
Medical Clinics of North America
Mental Hygiene